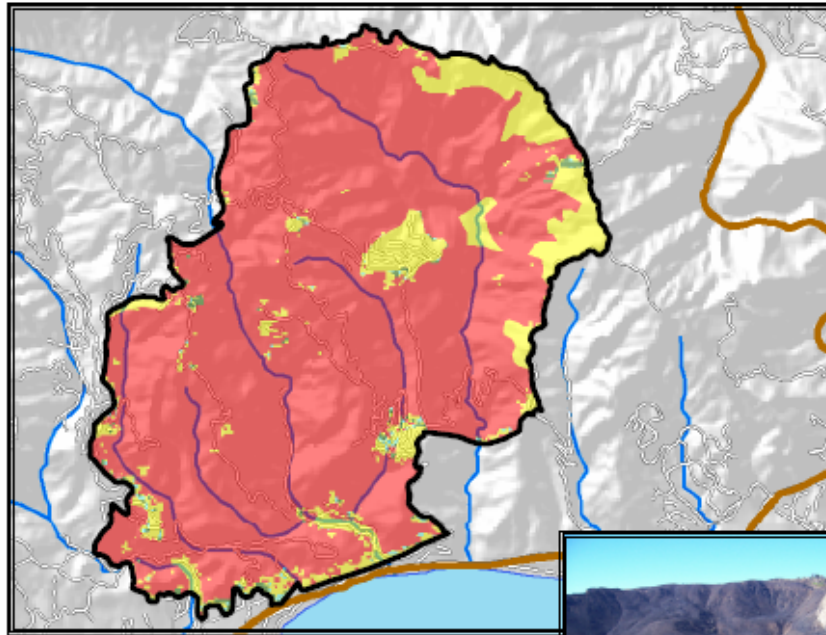


CORRAL FIRE

CA-LAC-259483



Santa Monica Mountains
Los Angeles County, CA



Interagency State Burned Area Emergency Response (BAER) Report

PUBLIC COPY

DRAFT

Affecting Watersheds in Los Angeles County
California

EXECUTIVE SUMMARY

CORRAL FIRE CA-LAC-258483

Affecting watersheds in Los Angeles County California

For the first time, the State of California implemented a Burned Area Emergency Response (BAER) assessment in response to the fires of October/November 2007. The BAER teams were composed of representatives of multiple State agencies and disciplines.

Introduction

An initial Burned Area Emergency Response (BAER) assessment has been completed for the 2007 Corral Fire CA-LAC-258483. The State BAER assessment had four key objectives:

- Identify on-site and downstream threats to public health or safety and property from landsliding, debris torrents, flooding, road hazards, and other fire related problems.
- Identify threats to watershed resources including excessive erosion; impaired water quality; threats to wildlife, botanical values, or fisheries; and threats to cultural resources.
- Identify any other values at risk not previously identified
- Determine measures needed to prevent or mitigate identified threats.

BAER teams conduct surveys promptly on burned areas to determine if emergency rehabilitation treatment is needed to minimize the risk of threats to human life or property. These surveys also assess if emergency rehabilitation treatment is needed to minimize or prevent deterioration of water quality, minimize loss of soil productivity due to erosion, minimize or prevent degradation of wildlife and botanical habitat, and minimize or prevent degradation of cultural resources. These surveys also facilitate identification of other potential values at risk (for example public facilities), and determination if emergency rehabilitation treatment is needed.

Post Fire effects determination for “Values at Risk” as identified in the State Burn Area Emergency Response (BAER) Reports.

In general, the risks from landslides, debris flows and rock falls are possible where roads, residences or other development are located within and/or adjacent to canyon stream channels or on alluvial fans, colluvial footslopes and debris flow deposits. It should be noted that these hazards are part of the natural processes in

this environment. The potential for these processes to be exacerbated by fire is primarily dependent upon burn severity and slope steepness, both of which are highly variable in the Corral Canyon area. Many existing structures in the burn area have been and will continue to be at risk from these hazards. In general, where the slopes are steep, burn severity is moderate or high, loose soil is present near stream channels and below geologic features where “Values at Risk” have been identified by technical specialist reports.

The Values at Risk for life, property and resources were identified by the technical specialist reports and rated using a scale from High to Low. Prominent hazards were identified and rated for post fire and pre fire conditions. The scale indicates the relative danger from hazards identified.

The rating indicates that there is an increased risk to life, property, and resources from the hazard for the at risk feature. The level of the rating was determined based on the field evaluation and office review of areas identified. The determinations are variable and site specific. The determinations are to be used for advisory actions to prevent potential threats to life, property, and resources.

The recommendations (treatments/protection measures) found in this report fall into one of two broad categories. Those treatments which can be considered temporary (short-term) measures designed to be quickly and relatively inexpensively implemented; and long-term treatments designed to facilitate the recovery of the watershed at an accelerated pace while concurrently minimizing the exposure of the values at risk to the threats identified.

The following information summarizes key findings contained in the initial Corral Fire State BAER assessment.

Loss of Human Life and Property

The principal concern with the Corral fire is loss of human life and property due to an increase in the potential for in-channel floods, hyper-concentrated floods, debris torrents, and debris flows. Houses and communities near or within stream channels (Escondido Canyon, Latigo Canyon, Solstice Canyon, Dry Canyon and Corral Canyon) appear to be in positions where significant in-channel floods, hyper-concentrated floods, debris torrents, mass wasting and debris flows are possible. In addition, possible loss of life resulting from localized debris sliding, debris flows, and sediment laden floods onto individual homes beyond the areas described previously is also possible.

Watershed Evaluation

The Corral Fire encroached upon four watersheds as defined by a The Cal-Water designation. These watersheds are Escondido Canyon, Latigo Canyon, Solstice Canyon, and Corral Canyon.

The principal concern with the Corral Fire is an increase in the potential for in-channel floods, hyper-concentrated floods, debris torrents, mass wasting and debris flows. The primary mechanisms for this are the loss of mechanical support of hillslope materials that was provided by vegetation and vegetative litter and the increase in runoff resulting from reductions in interception and infiltration, from the simplification of surficial runoff patterns, and from the loss of mechanical support along stream channels where riparian vegetation was burned. The reduction in interception may be affected by the development of hydrophobic soils where waxy substances released by plant materials during hot fires follow thermal gradients into the soil and congeal as continuous surfaces.

It is our understanding that the USDA Forest Service, in concert with the US Geological Survey and CAL FIRE are developing models to assess the potential magnitudes of post-fire events.

Values at Risk

In general, as a result of the fire and the impact to the processes previously discussed in the section on watershed evaluation, there is an increased risk for storm events to result in flooding, debris torrents, and debris flows. As storm intensity or duration rises, there will be an increased elevation in risk for the storm event to trigger flooding, debris torrents, and debris flows.

Threats to Human Life, Property, and Infrastructure

As discussed previously, a result of the fire and the impact to the processes previously discussed in the section on watershed evaluation is that houses and the associated human occupancy, other property (e.g. barns, stables, water tanks, etc.) and infrastructure (e.g. roads, bridges, culverts) located within or adjacent to the fire perimeter can expect higher than normal flows with possible bulking/debris flow and landslides in all rain events. The higher the rainfall intensity the higher the risk for landslides, flooding and debris flow throughout all Corral Fire burned area basins. This threat includes the loss of life and property. This risk is greatest in the Malibu Bowl, Malibu Hills, and Malibu Vista, houses at the bottom of Corral, Dry, Latigo, Escondido and Solstice Canyons areas.

Threats to the watershed

As a result of the fire and the impact to the processes previously discussed, the threat to the watershed, can be expected higher than normal flows with possible bulking/debris flow in all rain events. The higher the rainfall intensity the higher the risk for flooding and debris flow throughout all Corral Fire burned area basins. As shown in the following table.

Location	Pre-Fire Sediment (tons)	Pre-Fire Sediment (t/ac)	Post-Fire Sediment (tons)	Post-Fire Sediment (t/ac)	Sediment Increase
Escondido Canyon	1,150	0.5	2,397	1.0	2.1
Latigo Canyon	407	0.5	6,404	7.9	15.7
Solstice Canyon	1,421	0.5	11,632	4.1	8.2
Corral Canyon	2,150	0.5	19,637	4.6	9.1
Monte Nido (Malibu Canyon)	6,715	0.5	12,745	0.9	1.9

Watershed sediment loading estimates for burned area

Threats to Wildlife, Botanical Values, and Fisheries

As a result of the fire and the impact to the processes previously discussed in the section on watershed evaluation, biological, botanical, and fisheries habitat is at an increased risk to the threat of flooding, debris torrents, and debris flows. Suppression activities (e.g. “dozer lines”) have also contributed to the current risk to biological, botanical, and fisheries habitat. The risk is greatest for those areas of the Corral Fire which contain habitat for state and federally listed rare, endangered, or threatened species, state species of special concern.

Threats to Cultural Resources

As a result of the fire and the impact to the processes previously discussed in the section on watershed evaluation, cultural resources are at an increased risk to the threat of flooding, debris torrents, and debris flows. Additionally, there is an increased risk of the exposure of cultural sites as a result of the fire or the associated suppression activities removing protective vegetative cover. Field assessment confirmed these findings. The risk from the fire is greatest to those cultural sites that have been exposed as a result of the fire or the associated suppression activities that could be vandalized or otherwise compromised.

Area Burned

The Corral Fire perimeter encompasses 4,709 acres. Ownership is as follows:

Ownerships	Acres
Private (within NRA)	3202
Other public agencies	93
State Park Agencies (CDPR, MRCA, SMMA, UC)	669
National Park Service	745
	4709

Soil Burn Severity

Soil burn severity is the amount of heat that is released by a fire and how it affects other resources. Soil Burn Severity on the Corral Fire has been determined to be as follows:

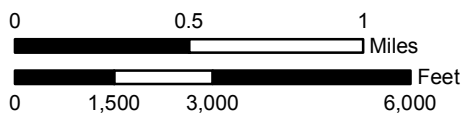
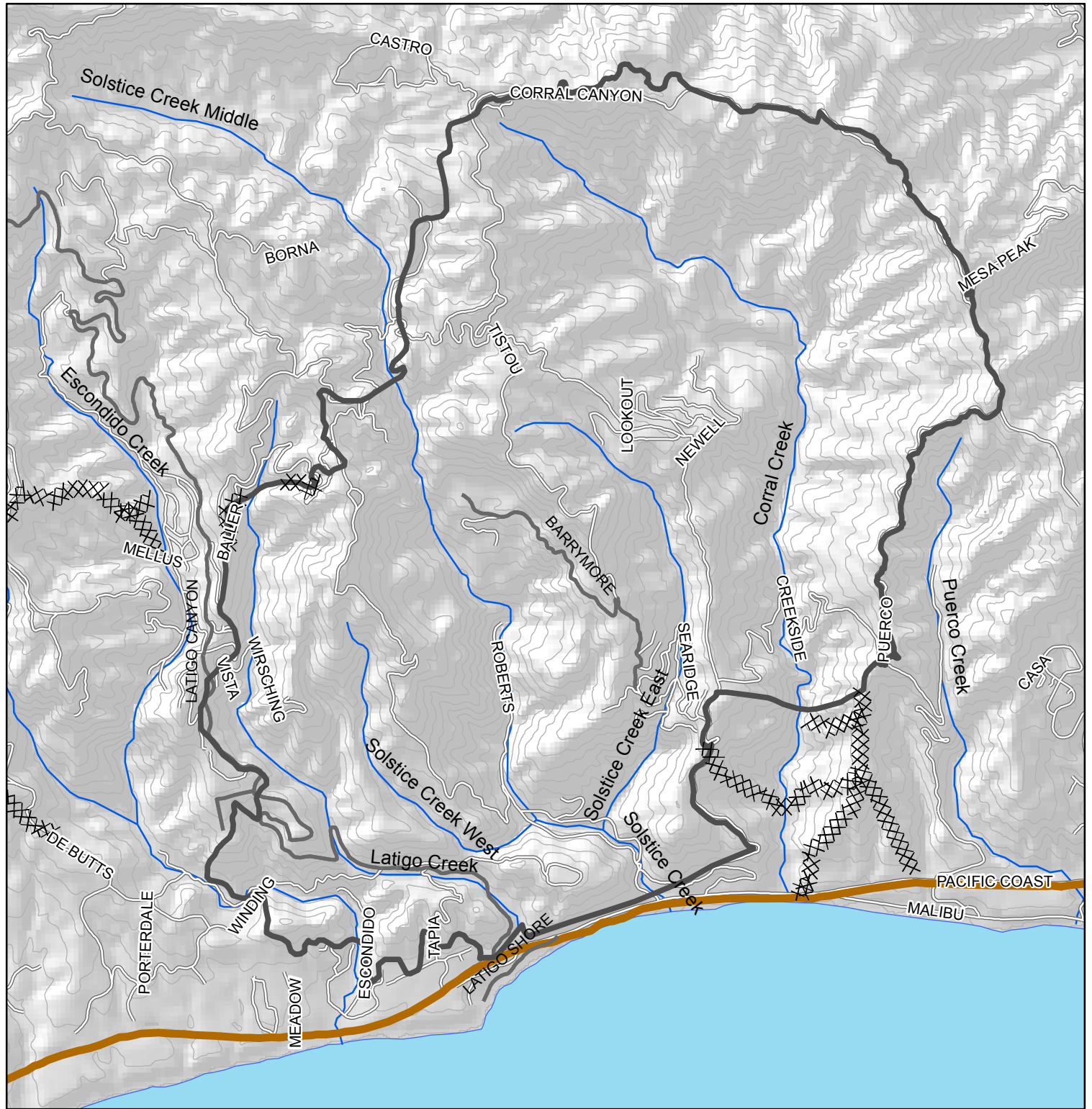
High:	3767 acres	/ (80%)
Moderate:	942 acres	/ (20%)
Low:	nominal	< 1%
Total	4709 acres	100%

Summary

The fire and the resultant impact to the processes previously discussed have shown an increased risk to the threat of life, property and natural resources from significant storm events. All values at risk identified could be adversely affected.

Corral Fire BAER

Reference Map



 Corral Fire Perimeter

BAER Team 13, S.Kennedy, GISS(T), VCFPD
Perimeter: LACO FireDept

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Brooks Engelhardt	USDA-NRCS

Introduction

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- Determine measures needed to prevent or mitigate identified threats.

BAER teams promptly conduct surveys on burned areas to determine if emergency rehabilitation treatment or exigent protections measures are needed to minimize the risk of threats to human life, property and natural resources. These surveys also assess if emergency protection treatment is needed to minimize or prevent deterioration of water quality, minimize loss of soil productivity due to erosion, minimize or prevent degradation of wildlife and botanical habitat, and minimize or prevent degradation of cultural resources. These surveys also facilitate identification of other potential values at risk (for example public facilities), and determination if emergency rehabilitation treatment is needed.

Post Fire effects determination for “Values at Risk” as identified in the State Burn Area Emergency Response (BAER) Reports.

In general, the risks from landslides, debris flows and rock falls are possible where roads, residences or other development are located within and/or adjacent to canyon stream channels or on alluvial fans, colluvial footslopes and debris flow deposits. It should be noted that these hazards are part of the natural processes in this environment. The potential for these processes to be exacerbated by fire is primarily dependent upon burn severity and slope steepness, both of which are highly variable in the Corral fire area. Many existing structures in the burn area have been and will continue to be at risk from these hazards. In general, where the slopes are steep, burn severity is moderate or high, loose soil is present near stream channels and below geologic features where “Values at Risk” have been identified by technical specialist reports.

The Values at Risk for life, property and resources were identified by the technical specialist reports and rated using a scale from High to Low. Prominent hazards were identified and rated for post fire and pre fire conditions. The scale indicates the relative danger from hazards identified.

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The recommendations (treatment/protection measures) found in this report fall into one of two broad categories. Those treatments which can be considered temporary (short-term) measures designed to be quickly and relatively inexpensively implemented; and long-term treatments designed to facilitate the recovery of the watershed at an accelerated rate while concurrently minimizing the exposure to the values at risk from the threats identified.

Summary

The fire and the resultant impact to the processes previously discussed in this report has resulted in an increased risk for storm events to result in flooding, debris torrents, mass wasting, landslides, and debris flows. As storm intensity or duration rises, there will be a simultaneous elevation in risk for the storm event to trigger flooding, debris torrents, and debris flows. These events could result in the loss of human life and property. All values at risk identified could be adversely affected.

GEOLOGY & SOILS

Resource Condition Assessment

Resource Setting

The 4,709-acre Corral fire burn area geology consists of Tertiary and Cretaceous sedimentary, volcanic and shallow intrusive rocks. These rocks are exposed in surface outcroppings throughout the Corral Fire burn area. In addition to rock outcroppings, surface geology in the area consists of Quaternary alluvium and landslide deposits. The Tertiary and Cretaceous rocks are highly fractured. Landslide deposits that were observed consisted of a mixture of rock and alluvium, and were found throughout the burn area. Vegetation helps stabilize hillsides. Potentially both existing and future landslides could be mobilized as a consequence of vegetation loss from the Corral Fire. Vegetation helped stabilize the hillsides. Topography within the burn area ranges from gentle to very steep,

to very steep, with Elevations ranging from sea level to 2100 feet. The burn area drains into intermittent streams that discharge into the Pacific Ocean.

Resource Assessment

From Remit modeling and the Los Angeles County Department of Public Works Hydrology and Sedimentation Manual methodologies, peak flows may be expected to increase from two to four times and sediment loading conditions may be increased up to four to ten times with large storm events.

Findings of the On-The-Ground Survey

Residences, roads, trails, culverts and bridges within and adjacent to the State Responsibility Area (SRA) and Local Responsible Area (LRA) burn perimeter are at risk of damage from flooding and debris flows. Steep canyon slopes combined with unstable rock formations and alluvial deposits create the potential for the occurrence of landslide and debris flow events. The removal of vegetation from these areas by fire greatly increases the likely hood that a landslide or debris flow will occur in the near future. High precipitation events that occur in the near future will have a much higher likely hood of producing a landslide or debris flow event than when pre-fire conditions existed.

Condition of Values at Risk

Residences in the burned area were directly impacted by the fire with many damaged and destroyed. Residences in the burned area that were directly impacted by the fire as well as those not directly impacted by the fire are Values at Risk. Infrastructure such as roads and culverts are also at risk.

Emergency Determination

The possibility and likelihood of increased runoff and debris flow during rain events puts all resources at risk.

Treatments to Mitigate the Emergency

Potential treatments include:

- Early warning systems/Evacuation plans
- Removal of burned woody debris
- Installation of fine sediment and large debris catchments above culverts
- Clean and clear existing sediment and debris at culverts
- Assess and repair burned retaining walls, roadway guard rails, and bridges

- Monitoring before and after rain events for debris flow on all resources listed
- Standard soil erosion control features for hillsides.

The treatment objective is:

- Protect life, property, and natural resources

Discussion/Summary/Recommendations

Expect higher than normal flows with possible bulking/debris flow and landslides in all rain events. The higher the rainfall intensity the higher the risk for landslides, flooding and debris flow throughout all Corral Fire burned area basins.

References – See attached Geology/Soils Technical Report

Appendices – See attached Geology/Soils Technical Report

HYDROLOGY/ENGINEERING

Resource Condition Assessment

Resource Setting

The 4,709 acre Corral Fire burn area consists of mild-to very-steep slopes with annual rainfall averaging about 15 to 20 inches in the area along the Pacific Coast just to the northwest of Los Angeles, in Southern California.

The fire burned large parts of four canyon watersheds named from west to east: Escondido Canyon, Latigo Canyon, Solstice Canyon, and Corral Canyon. The canyons each contain intermittent streams that drain under the Pacific Coast Highway (PCH) to the Pacific Ocean.

The four watersheds encompass 10,256 acres of which 46% or 4709 acres were burned. The small intermittent streams are ungaged and unregulated and flow in steep rocky canyons from about 2100 feet of elevation to sea level.

Resource Assessment

Background sediment data was estimated with a relatively new computer program denoted as ERMiT (Erosion Risk Management Tool) developed by the USFS Rocky Mountain Research Station (Robichaud et al. 2006, 2007). Predicted sediment yields are calculated from the estimated probabilities for different storms, burn severity patterns, and soil characteristics (Larson et al. 2007). From the ERMiT modeling and the Los Angeles County Department of

Public Works Hydrology and Sedimentation Manual methodologies, peak flows may be expected to increase from two to four times and sediment loading conditions may be increased up to two to sixteen times with large storm events or more, depending on what exceedence probability is chosen from the ERMiT output (50% confidence interval was used).

Findings of the On-The-Ground Survey

Water resources, roads, trails, culverts and bridges within and adjacent to the State Responsibility Area (SRA) burn perimeter are at risk of damage from flooding and debris flows.

Generally, water resources, roads, trails, culverts, and bridges in the burned area were not directly impacted by the fire and appear to be in satisfactory condition. However, many of the watersheds and some infrastructure in the burn area suffered high burn severity in the upper elevations.

Emergency Determination

The possibility and likelihood of increased runoff and debris flow during rain events puts all resources at an increase risk.

Treatments to Mitigate the Emergency

Treatment Type

- Early warning systems/Evacuation plans
- Removal of burned woody debris
- Installation of fine sediment and large debris catchment above culverts
- Clean and clear existing sediment and debris at culverts
- Assess and repair burned retaining walls, roadway guard rails, and bridges
- Monitoring before and after rain events for debris flow on all resources listed

Treatment Objective

- Protect life, property, and natural resources

Discussion/Summary/Recommendations

Expect higher than normal flows with possible bulking/debris flow in all rain events. The higher the rainfall intensity the higher the risk for flooding and debris flow throughout all Corral Fire burned area basins.

References – See attached Hydrology/Engineering Tech. Report

Appendices – See attached Hydrology/Engineering Tech. Report

WILDLIFE

Resource Condition Assessment

Resource Setting

The 4,709-acre Corral fire burned four drainages (Latigo Canyon, Solstice Creek, Dry Creek and Corral Creek) within the Santa Monica Mountain system, in Malibu, California. The drainages are ephemeral (Latigo Canyon, Dry Creek and Corral Creek) and perennial (Solstice Creek) creeks. The habitat types within the burn area include: coastal sage scrub, oak woodlands, riparian and mostly nonnative grasslands. Land ownership impacted by the Corral Fire include: Malibu Creek State Park, National Park Service, Santa Monica Mountain Conservancy, private and City of Los Angeles Land.

Findings of the on the ground survey

A high percentage of the Coastal sage scrub habitat burned at a high severity, with a mosaic of moderate to low burn patterns. Direct impacts to coastal sage scrub were of moderate to high severity. Chaparral habitat of the Santa Monica foothills on the eastern and southern portions of the fire burned at a high severity.

Emergency Determination

The impacts to nature resources described in this report do not constitute an emergency based on the lack of threatened, endangered, and/or sensitive species impacted by the fire. However, it is important to increase the understanding of drainage and habitat impacts due to catastrophic events such as fire. The monitoring of stream habitat and sedimentation deposition assessment would increase the level of understanding of drainage recovery and steer proper restoration management practices. Similarly, post fire monitoring of coastal sage scrub and oak woodland communities would assist in how these habitats recover as well.

Treatment to Mitigate the Emergency

- Implement appropriate BMPs upstream of sensitive riparian habitats to minimize sediment load.
- Conduct revegetation efforts where appropriate to promote rapid recovery of native habitats.
- Conduct post fire population surveys for wildlife species.

- Conduct long-term monitoring of key species to document long-term population trends as a result of the fire.
- Coordinate local agency activities during maintenance activities to avoid, minimize, and mitigate additional impacts to species.

FISHERIES

Resource Condition Assessment

Resource Setting

The Corral Fire area contains four drainages (Latigo Canyon, Solstice Creek, Dry Creek and Corral Creek) within the Santa Monica Mountain system. The fire impacted City, State, National Parks and private land. No federal or State threatened or endangered aquatic species occupy Solstice or Corral Creek. No federal or State threatened or endangered wildlife species exist within the fire perimeter.

Findings of the on the ground survey

No native fisheries issues are present within the surveyed creeks.

Emergency Determination

As it relates to life, property and immediate negative impacts to fisheries resources, the issues described in this report do not constitute an emergency. However, despite the lack of sensitive fisheries issues, it is important to increase the understanding of drainage impacts due to catastrophic events such as fire. The monitoring of stream habitat and sedimentation deposition assessment would increase the level of understanding of drainage recovery and steer proper restoration management practices.

Treatment to Mitigate the Emergency

While this section does not describe an emergency as defined by the Federal Emergency Determination, there are still methods and treatments that can be used to minimize the effects and potential impacts of the fire.

References

Spina, A. P., and D. Tormey. 2000 Post fire Sediment Deposition in Geographically Restricted Steelhead Habitat. North American Journal of Fisheries Management 20:562-569, 2000.

BOTANY

Resource Condition Assessment

Resource Setting

Three Rare, Threatened and Endangered plants occur within the burn and fire suppression footprint. The burn area consists of numerous Plant Associations/Alliances of Coastal Sage Shrub, Chaparral, Riparian, Upland tree, Prairie/Meadows, Rock outcrop and exotic/invasive plant communities.

Findings of the On-The-Ground Survey

The presence of many weeds recorded by the National Park Service and the California State Park staff was confirmed by the on-site survey. Erosion gullies from road drainage structures was clearly visible, noted and recorded as they are conduits for weed introduction from road sides into native landscapes. To the east and west, outside of the burn area, fire contingency lines were dozed on protected state and federal land. Fire breaks were also constructed on Malibu State Park land that did significant habitat damage. These are in need of attention. Consultations with land managers brought to light a lack of adequate communication and/or proper interface with local fire agencies.

Emergency Determination is of a natural resource type

All the plant communities are at various degrees of post-fire risk from spread of invasive weed species facilitated by ground disturbance, erosion and fire. The risk of weed invasion is higher where erosion comes off road drainage structures. All species of chaparral shrubs, forbs, and grasses are well adapted to regenerate rapidly after fire, however, the non-native invasive species will out-compete most of the native annual species (wildflowers) as well as some perennials over time, leading to a shift from a native ecosystem to a mix of non-native weeds and a mix of surviving natives. Vegetation community type-conversion is the term for this process.

The burn alone does not threaten the three native plant species of concern but may be at risk if their locations are found to be infested by weeds. The same can be said for the White Alder-sycamore walnut woodland community. Invasive weed management is critical to ensure native species can recover in disturbed areas post fire. Impacted sensitive plants may be at risk from weed introduction or further ground disturbing activities.

Treatments to Mitigate the Emergency

Short and long term weed monitoring and eradication around all roads and dozer lines disturbed by fire suppression activities on or adjacent to public lands set aside for natural habitat preservation. Monitoring and the restoration of habitats sensitive to weed invasions to ensure associated assemblages return are important.

Due to the general shortening of intervals between fires coupled with weed infestations known from the area, careful monitoring with appropriate treatments should be done during the first growing season.

Those locations where invasive plant populations are reappearing and/or spreading need treatment plans and abatement implementation before the plants reproduce as they continue to germinate past their first appearance.

Erosion from road drainages and fire break construction need erosion control mitigation as such erosion is a conduit for weed introduction. Erosion from unnatural features unnecessarily destroy native soils and habitat.

Discussion

Additional suggestions include recommendations not to seed/hydroseed or mulch the burn area. Weed-free mulch and/or hydromulch can be used on disturbed soils on firebreaks but is a second choice to more comprehensive treatments mentioned in the specialist report. Fire adapted communities recover rapidly after a fire without treatment, if invasive weeds are not present. There is a need for the agencies charged with fire protection to work better in planning and implementation of fire control measures in the field with those agencies charged with protecting natural resources on public lands. Invasive plants are spreading into native habitats from private property, county roads, city landscapings and other adjacent lands. Public education on wildland weeds and fire and alternatives for invasive garden plants should be distributed to adjacent land/home owners as well as to the city of Malibu (see references).

References

Bell, Carl E., Brooks, Matthew L. and DiTomaso, Joseph M., 2007, Invasive Plants and Wildfires in Southern California, University of California, County of San Diego and the U.S. Dept. of Agriculture cooperating California Invasive Plant Council. 2006. Don't plant a pest! SouthernCaliforniaVersion. www.cal-ipc.org

CULTURAL RESOURCES

Resource Condition Assessment

Resource Setting

The 4,709 acre Corral Fire burn perimeter and contingency line zones includes prehistoric and historical archaeological sites and isolated finds.

Findings of the On The-Ground Survey

Cultural resources within and adjacent to the Corral Fire burn perimeter are at risk of damage or destruction from direct fire effects, fire suppression activities, rehabilitation of affected areas, and vandalism.

Condition of Values At Risk

The direct impacts of the fire appear to have been minimal to the archaeological sites under review, except for one instance where substantial damage was caused. Threats from burned historical structures on NPS land are being addressed in a separate NPS-led BAER assessment.

Emergency Determination

The values at risk considered in this assessment include the possible loss of cultural resources due to erosion from increased surface water runoff as well as damage from continuous fire suppression activities.

Discussion/Summary

Treatment Type

Documentation and Data Recovery
Archaeological Survey, Documentation

Treatment Objective

Recover significant archaeological data from exposed deposits prior to further degradation by weather, vandalism, erosion control, and habitat restoration.

Ensure that no additional archaeological resources are present along the graded east and west contingency lines that may require treatment prior to implementing any proposed erosion control or habitat restoration work.

Assess the potential for increased erosion and vandalism threats to previously recorded archaeological sites and any newly exposed sites that may be discovered during fieldwork

Treatment Description

Identify archaeologist (principal investigator) with appropriate credentials and experience to assess the site, and prepare and implement an Archaeological Treatment Plan.

Conduct archaeological surveys, prepare site record forms and Condition Assessment Reports, identifying fire damage, existing erosion, and potential threats to the integrity of the resource posed by post-fire conditions.

References

National Parks Service

GIS data for archaeological site in the Santa Monica Mountains Recreation Area and Vicinity (Robert S. Taylor)

South Central Coastal Information Center (SCCIC), CSU Fullerton

Archaeological site records, report/survey coverage maps (Stacy St. James and Thomas Shackford)

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INTERAGENCY STATE BURNED AREA EMERGENCY RESPONSE (BAER) Report

Corral: CA-LAC-259483

Appendices

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DRAFT TECHNICAL SPECIALIST ASSESSMENT
Burned Area Emergency Response Report

Resource: Geology/Soils

Fire Name: Corral Fire CA-LAC-259483

December 2007

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I. Resource Condition Assessment

Resource Setting

The 4,709-acre Corral Fire burn area geology consists of Tertiary and Cretaceous sedimentary, volcanic and shallow intrusive rocks. These rocks are exposed in surface outcroppings throughout the Corral Fire burn area. In addition to rock outcroppings, surface geology in the area consists of Quaternary alluvium and landslide deposits. The Tertiary and Cretaceous rocks are highly fractured. Landslide deposits that were observed consisted of a mixture of rock and alluvium, and were found throughout the burn area. Vegetation helps stabilize hillsides. Potentially both existing and future landslides could be mobilized as a consequence of vegetation loss from the Corral Fire. Soils in the fire area generally consisted of silty fine sand to fine sandy silt. Clays were present in some soils; in particular in those soils located at the canyon floors. Soil accumulation in general was greatest in the canyon floors, with soils generally less than a meter thick on many of the canyon hillsides. Hillside topography in many canyon areas was too steep to provide for soil accumulation. In many areas soils are mixed with gravel and rock. Much of the rock and gravel is highly friable, and breaks-up very easy. Many of the soils in the area are formed in-situ; from the mechanical weathering of the native rock. Therefore, soil formation and accumulation is highly dependent on the siltstone, shale, sandstone, and volcanic rock present in much of the burn area; much of which is highly prone to erosion, weathering, and fracture.

Topography within the burn area ranges from gentle to very steep, with elevations ranging from sea level to 1900 feet. The burn area drains into intermittent streams that discharge into the Pacific Ocean.

Survey Methods

A field reconnaissance survey of the Corral Fire burn area was conducted on November 30, 2007 and December 1, 2, and 3, 2007. Roads within the burn area were driven to identify where specific areas may be present that require additional on-site evaluations. Surveys were conducted on foot where vehicle access was not possible and where a closer inspection of the area was required. The field reconnaissance survey concentrated on potential impacts from flooding, debris movement, rock fall, or slope failure to "Values at Risk" such as residential development in the designated burn area. However, other development in the designated burn area including drainage culverts, roads, bridges, water tanks and retaining wall structures were also assessed. The potential exists for the possible loss of life and property due to slope-generated landslides, debris flows, rock fall, and associated slope movement.

II. Observations

General Observations

Steep canyon slopes combined with unstable rock formations and alluvial deposits create the potential for the occurrence of landslide and debris flow events. The removal of vegetation from these areas by fire greatly increases the likely hood that a landslide or debris flow will occur in the near future. High precipitation events that occur in the near future will have a much higher likely hood of producing a landslide or debris flow event than when pre-fire conditions existed. The reason for the increase in landslide and debris flow risk is that the removal of vegetation and vegetative litter reduces infiltration and absorption and increases precipitation runoff on hill slopes. It also results in the loss of bank support along stream channels where riparian vegetation was burned. High intensity fires may result in the development of hydrophobic soils, or soils that retard water infiltration, increasing runoff. Residences, roads, bridges, and other structures may be affected by local flooding and slope failure. The magnitude of post-fire damage will be partially determined by the intensity and duration of storms that impact the area. It appears that soils on the canyon slopes did not contain an abundance of organic matter prior to the fire. It appears that soils in hill side draws and at the bottom of canyons contained the most organic matter. Therefore, the highest intensity soil burn could often be observed in locations associated with these features.

Specific Observations

The BAER Team evaluated potential risks from debris flow and other geologic hazards for specific locations in the Corral Fire burn area including houses and infrastructure within and down-slope of the burn area. Specific locations included

residential areas in the vicinity of Malibu Bowl, Malibu Hills, Malibu Vista, Latigo Canyon Road and Barrymore Road.

Observations of potential geologic hazards were also made on each canyon in the burn area including Latigo, Solstice, Dry, and Corral. These observations are of geological hazards that could affect multiple residence and infrastructure.

Specific locations identified as having potential risks to lives or property do to geologic hazard(s) included:

- **Malibu Bowl**- Houses bordering the north of Malibu Hills will be the most vulnerable to landslide hazards. However, all houses in the outer boundaries of the Malibu Bowl area will be at potential risk from landslide hazards.
- **Malibu Hills**-Houses and structures built adjacent to the north side of Malibu Hills may be vulnerable to potential landslides. Houses and structures adjacent to the canyon floor and creek are highly vulnerable to a debris flow.
- **Latigo Canyon Road**-Houses built on historical slide at high risk of failure.
- **Barrymore Road**-Road is highly vulnerable to a landslide as well as all residence adjacent to and in the vicinity of the road.
- **Malibu Vista**-Houses and structures built on Latigo Canyon Creek Road, Latigo Bayview Drive, some destroyed by fire could be further damaged by landslides undermining building foundations.

In addition to the specific observations and associated risks given to populated regions of the Corral Fire Burn Area observations and associated risks associated with each canyon was also developed. These canyons included:

Latigo -The presence of numerous large scale historical slides in addition to the steep topography suggests that large scale sliding and debris flows have a high chance of occurring.

Solstice -High landslide and mass wasting hazard at the head of Solstice Canyon. Houses are located at the head of Solstice Canyon, at the western end of Barrymore Road, could be at risk.

Corral -Houses located at the bottom of this canyon are in high danger from debris flows. Houses located at the eastern side of Malibu Bowl have a high slide hazard potential.

Dry-Houses located adjacent to the bottom of the canyon in Malibu Vista have a High debris flow risk.

Specific observations and associated risks are presented in Appendix B.

III. Emergency Assessment

The risk(s) considered in this assessment include the potential for loss of life and property due to landslides, debris flow, rock fall, debris torrents, and flooding. The risk from landslides, debris flows and rock falls are more likely to occur where roads, residences or other development are located within and/or adjacent to canyon stream channels, alluvial fans, colluviums, and debris flow deposits.

These hazards were present under pre-fire condition; however the potential risk for these hazards to occur under post fire conditions is greatly increased. The potential for these processes to be exacerbated by fire is dependent upon burn severity and slope steepness, both of which are highly variable in the Corral fire area. In general, where the burn severity is moderately high, the slopes are steep, and the potential for increased hazard is greatest in the Latigo Canyon, Corral Canyon, and Solstice Canyon areas. The burn severity was generally high throughout the Corral Fire Designated Burn Area. Areas with potential risks to life and property from slope instabilities exist elsewhere in the vicinity of the Corral fire, but the assessment of sites that were not affected by the fire is beyond the scope of this evaluation.

IV. Potential Considerations

General Potential Considerations:

Observation included with this review should potentially be considered when developing emergency response plan(s) for the Corral Fire Designated Burn Area.

Existing drainage systems should be inspected, assessed, and maintained by the responsible party; with any required maintenance of these systems carried out as soon as possible. Maintenance of these systems is critical to help alleviate potential impacts to the burn area and the burn area vicinity from flood, debris flow, landslides and sedimentation resulting from storm events.

Federal, State, and local responsible agencies should be made aware of the potential hazard to lives and property in and downstream of the burn area.

Campgrounds, hiking trails, and other recreational areas in the burn area or down slope of the burn area should be signed and closed as needed by the responsible agencies and organizations to protect campers and hikers.

Specific Potential Considerations:

The locations considered to be at a potentially high risk to geologic related hazards should be evaluated by Professional Geologists and/or Professional Engineers with experience in slope stability and debris flow hazard assessment and mitigation to provide recommendations for potential problems that may or may not be present in each location. Additional locations for geologic hazards may be identified in the future as additional information is obtained from varied sources.

The homes designated as moderate to high risk for erosion and flooding should consider contacting the Los Angeles Flood Control District. Los Angeles County has compiled a list of Best Management Practices (BMPs) that can be implemented by property owners after a fire and when rain is expected. The BMPs are as follows:

- Fiber Rolls (straw, flax or other material)
- Gravel Bag Berms
- Sand Bag Barriers
- Geotextiles and Erosion Control Mats

The description, installation and operation of these practices are from the California Stormwater BMP Handbook (www.cabmphandbooks.com).

V. References

D.M. Morton, R.M. Alvarez, and R.H. Campbell. Soil-Slip Susceptibility Map for part of the Los Angeles 30' x 60' Quadrangle, Southern California, Preliminary Soil-Slip Susceptibility Maps, Southwestern California
Yerkes, R. F. , and Campbell, R. H. , 1997, Preliminary geologic map of the Point Dume 7.5' quadrangle, southern California: A digital database: U.S. Geological Survey Open-File Report 97-276.
Dibblee, Thomas W., Jr., 1993, Geologic Map of the Malibu Beach Quadrangle, Los Angeles County, California: Dibblee Geological foundation Map #DF-47, 1 sheet, Scale 1:24,000.
Add references like geology maps

DRAFT TECHNICAL SPECIALIST'S
Burned Area Emergency Response Report

Resource: Hydrology/Engineering

Fire Name: Corral Fire CA-LAC-459483

December 2007

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I. Potential Values at Risk

The values at risk identified in this assessment are the possible loss of life and property that may occur due to anticipated increased sedimentation, debris flows, and potential flooding in and downstream of the burned areas. Additionally, roads, bridges, and culverts may also be at risk due to increased flow in the creeks and potential clogging of culverts drainage structures by debris.

II. Resource Condition Assessment

Resource Setting

The 4,709 acre Corral Fire burn area consists of mild-to very-steep slopes with annual rainfall averaging about 15 to 20 inches.

The Corral Fire burned parts of four canyon watersheds named from west to east: Escondido Canyon, Latigo Canyon, Solstice Canyon, and Corral Canyon. The canyons each contain intermittent streams that drain under the Pacific Coast Highway (PCH) to the Pacific Ocean. Some areas in the adjacent Malibu Canyon area were burned as the fire crossed the basin rim roads but these areas are estimated to total only 0.1% of the Malibu Creek watershed area using the incident boundary shape from November 27 and the watershed definitions from CalWater 2.2.1. Stream channels

in the four watersheds are named after the canyons and the entire fire area is within the HUC 6 Ventura-San Gabriel basin (180701). The CalWater subbasins were selected for analysis since the scale is more appropriate to the Corral Fire burned area.

The topography of the area ranges from about 2100 feet above mean sea level along the northern edge of the fire near the ignition point to a low of near sea level along the PCH. The Escondido drainage has a small west branch that joins the main stem about two thirds down its length to the coast. The Solstice Canyon drainage has three branches of which the middle is the longest from the basin rim down the center of the burned area.

Water Supply

Residents and other water users of the area are served by Las Virgenes Municipal Water District (LVMWD) in the foothills and West Basin Municipal Water District (WBMWD) along the coast. Both water districts are supplied by the Metropolitan Water District of Southern California whose supplies include Colorado River water and San Francisco Bay Delta water conveyed by the California State Water Project as well as local supplies of surface water, groundwater, and recycled water. A majority of the burned area is supplied by the LVMWD. WBMWD has an extensive water recycling system which involves a significant amount of infrastructure to provide a wide variety of uses and qualities from non-potable irrigation to supplementing the seawater intrusion barrier to preserve local groundwater quality.

Precipitation

The 2006 Los Angeles County Department of Public Works (LAC DPW) Hydrology Manual lists an average annual value for precipitation in the coastal plain areas of 15.5 in/yr. Mean annual precipitation in the burned area is about 20 inches per year by averaging three LA County Alert gages; Lechuza Patrol (Alert ID 454) to the west, Agoura (Alert ID 317) to the north, and Monte Nido (Alert ID 319) to the east. Since the streams do not have constant flow throughout the year, they are unnamed and do not have stream flow gages. Due to the history and danger of fire there are meteorological stations which provide fire condition information such as temperature, humidity, wind conditions, fuel moisture, and temperature (wood probe). These are available from the California Department of Water Resources California Data Exchange Center (CDEC, cdec.water.ca.gov) station names MCY, CHE, and MLB maintained by Los Angeles County, National Park Service, and Los Angeles County Fire Dept, respectfully.

Streams

The four canyon watersheds from west to east; Escondido, Latigo, Solstice, and Corral are ungaged intermittent streams. Two USGS streamgage stations just to the east are Malibu Creek at Crater Camp near Calabasas (USGS 11105500) and Cold Creek tributary near Malibu Beach which flows into Malibu Creek (USGS 11105200). Malibu Creek has a historic peak flow of 33,000 cfs, but is much larger than the watersheds of the Corral Fire. Its tributary Cold Creek is closer to the same scale as the Corral Fire burned watersheds but is of somewhat different orientation. Its historic peak flow is just less than 100 cfs.

Watersheds

The following section contains a discussion of each of the individual watershed areas and a table of pre- and post- fire peak flows for different return period classes.

Corral Fire
BAER

Watersheds and Streams

Figure 2

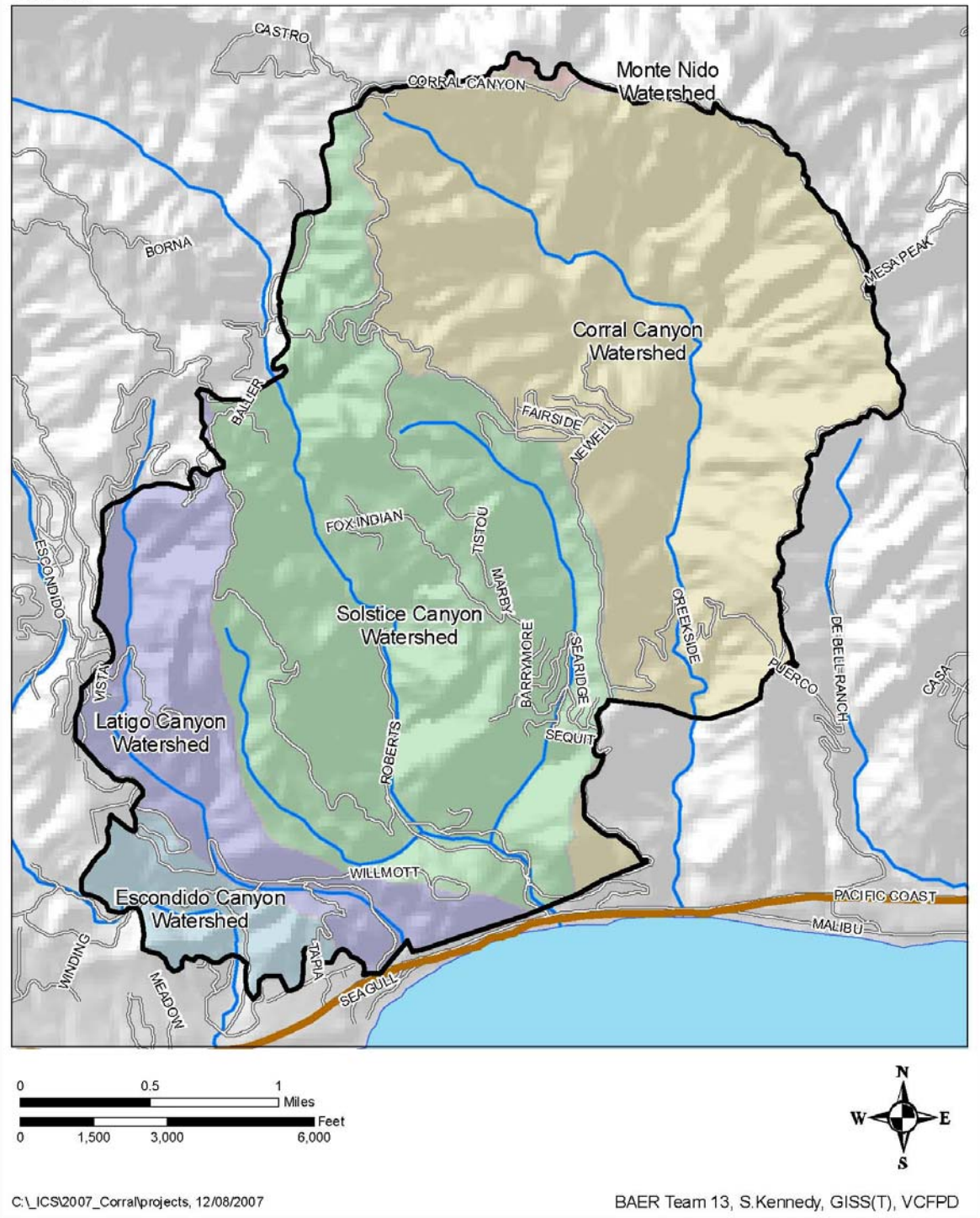


Figure 2. Corral Fire burned area watersheds (CalWater 2.2.1)

Escondido Canyon (drainage area 2300 acres, 204 acres burned, 9% burned)

The western most watershed of the Corral Fire, Escondido Canyon was burned moderately to severely on the southeastern portion. It was burned across its drainage near the outlet above the Malibu Cove Colony area where it drains two branches from 1969 ft and 1312 ft of elevation under the PCH to the Pacific Ocean. There was an extensive contingency dozer line completed from Latigo Canyon across Escondido Canyon and along the ridge between Escondido Canyon and Ramirez Canyon. There are a number of residences along the ridge between Escondido and Latigo Canyon which were largely preserved but a number of houses were damaged and destroyed.

Latigo Canyon (drainage area 814 acres, 606 acres burned, 74% burned)

The Escondido and Solstice drainages surround Latigo Canyon to the north and on either side. It narrows near its mouth where it splays to a wider mouth between Latigo Point and Dan Blocker State Beach. The drainage begins around 1640 feet of elevation to the Pacific Ocean under the PCH.

Solstice Canyon (drainage area 2842 acres, 1845 acres burned, 65% burned)

Solstice Creek is the longest and most extensive drainage in the fire area and begins at about 2,130 ft elevation and has two smaller branches on either side which join its main stem in Solstice Canyon Park in National Park Service land. The upper reaches of Solstice Creek drain part of Castro Crest National Park Land through private or County holdings to the Solstice Canyon Park area before discharging to the Pacific Ocean.

Corral Canyon (drainage area 4300 acres, 2035 acres burned, 47% burned)

The Corral Fire burned the southeast corner of the Corral Canyon drainage just prior to the Corral Fire. The drainage begins at about 1804 feet of elevation near the north edge of the fire perimeter and the central channel flows southeast to above its midpoint where it turns south to the coast. The Corral Fire burned the upper northwest portion of the drainage and extensive contingency dozer lines were cut along the ridges of the lower portion of the basin. The ignition point of the fire was in the Malibu Creek State Park area at the upper rim of the basin. The lower Corral Canyon area is held by the Santa Monica Mountains Conservancy (MRCA) and the fire perimeter was held across Corral Creek from Puerco

Canyon Rd towards the community of El Nido largely preserving the MRCA land.

Monte Nido (Malibu Canyon) 13430 acres, 16 acres burned, 0.1% burned)

The only parts of Malibu Canyon which burned in the Corral Fire were parts of the larger basin rim on the North side of the fire perimeter near the ignition point where the fire seems to have crossed the dirt road. These areas are not extensive, nor are they expected to have a significant effect on the peak flows or sediment load for Malibu Creek. The mid to lower portion of the watershed did burn in the Canyon Fire and details are included in the Canyon Fire BAER report.

Resources Assessment

Peak Flow Evaluation

Peak flows were assessed using the LAC DPW Hydrology Manual's Modified Rational Method for peak flows and include an assessment of the increase for the percent area burned within the watersheds. The general geometry of each stream reach was used in the spreadsheet analysis provided by the LAC DPW. Burned area fine sediment can have a bulking effect on rainfall runoff. Initial flow estimates and burned area increases by return period frequency class were then used in the Sedimentation manual method to estimate bulked flows. The values are summarized in a table for reference. Generally the burned areas may be expected to produce runoff increases from nearly normal to two and a half times as much flow for the watersheds which burned more completely. Including the bulking factor in the analysis increases the flows by up to about four times the initial flow estimates by volume.

INITIAL ESTIMATE OF PEAK FLOWS

	2 yr	5 yr	10 yr	25 yr	50 yr	100 yr	500 yr
Escondido	1310	1977	2417	2972	3385	3798	4745
Latigo	413	623	762	937	1067	1197	1496
Solstice	1160	1750	2140	2631	2997	3362	4201
Corral	1912	2886	3528	4339	4942	5544	6928
Malibu Cr	4662	7035	8601	10577	12047	13516	16889

BURNED ESTIMATE OF PEAK FLOWS

	2 yr	5 yr	10 yr	25 yr	50 yr	100 yr	500 yr
Escondido	1332	2010	2457	3021	3441	3861	4824
Latigo	1052	1588	1941	2387	2719	3051	3812
Solstice	2326	3510	4291	5277	6010	6743	8426
Corral	4589	6925	8467	10411	11858	13305	16625

Malibu Cr	4819	7271	8890	10932	12451	13970	17456
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BURNED AND BULKED ESTIMATE OF PEAK FLOWS

	2 yr	5 yr	10 yr	25 yr	50 yr	100 yr	500 yr
Escondido	2064	3115	3808	4683	5334	5984	7478
Latigo	1684	2541	3106	3820	4350	4881	6099
Solstice	3605	5440	6651	8179	9316	10452	13060
Corral	7067	10665	13039	16033	18261	20489	25602
Malibu Cr	7276	10980	13424	16507	18801	21095	26359

Table 2. Peak flow estimates for pre-fire, burned, and bulked conditions
For all return period frequency classes the proportional increase is the same because the LA County DPW Sedimentation and Hydrology Manuals use multipliers from regression analyses to factor up or down from the 50 year return period 24 hour storm. The difference between burned and burned and bulked estimates for all frequency classes is shown in table 2.

	BURNED	BURNED AND BULKED
Escondido	1.0	1.6
Latigo	2.5	4.1
Solstice	2.0	3.1
Corral	2.4	3.7
Malibu Cr	1.0	1.6

Table 3. Increase in sediment load above pre-fire conditions

1. Sediment Load Evaluation

Sediment loading was assessed using the percentage burned from the Los Angeles County Hydrology Manual modified rational method and compared with ERMiT modeling used for previous fires in 2007. The climate for the model was varied along with soil burn severity conditions and several default parameters selected for the local area to compare potential sediment loading estimates from the burned watersheds. The stochastic sediment loading was then used to generate area specific mass figures for each of the watersheds using a method developed for the Rice Fire. The modeling result should only be used as a rough estimate to perhaps bound and inform local decisions which should be based on site specific and incoming meteorological conditions. The ERMiT output seems to predict a low sediment loading and so a wetter climate and high burn severity chart is provided as an example.

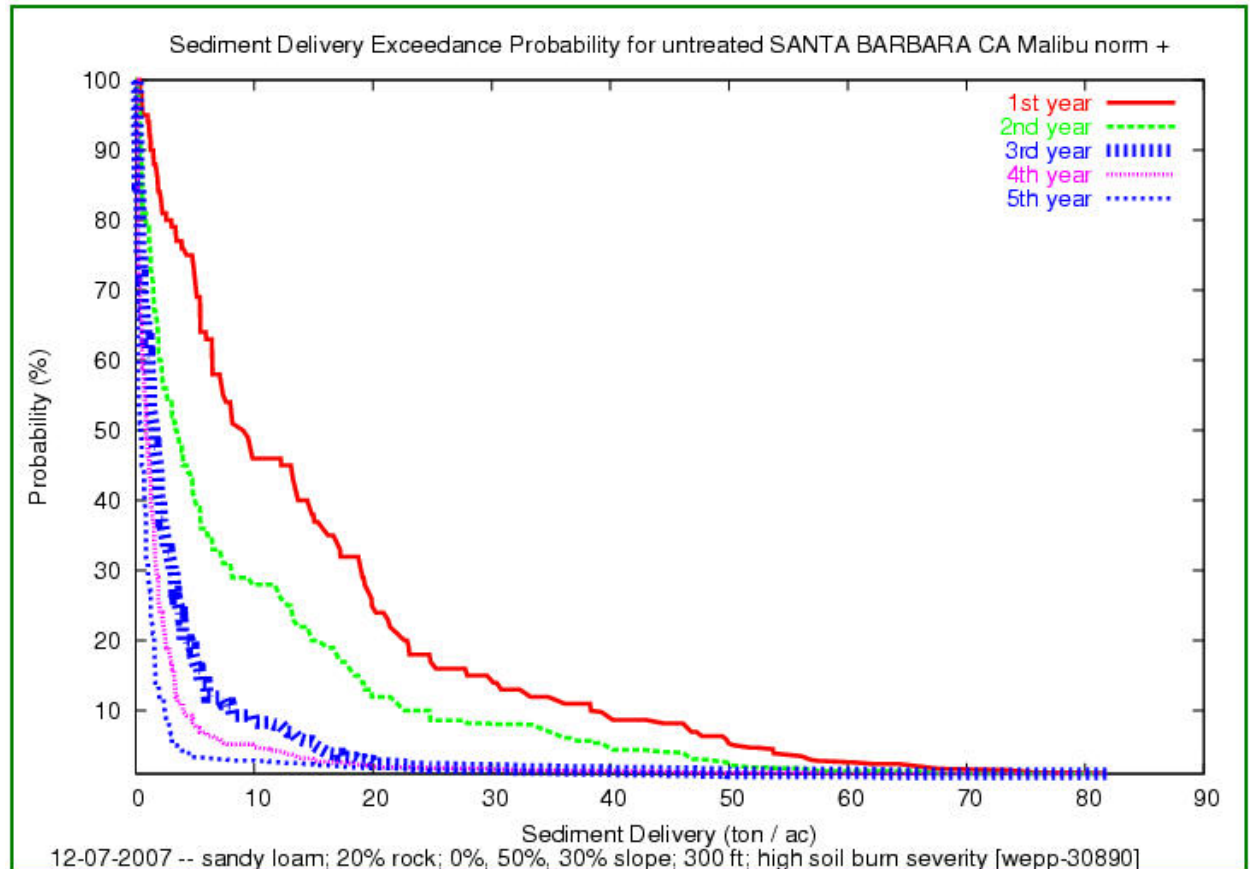


Figure 3. ERMIT stochastic sediment loading estimate

Location	Pre-Fire Sediment (tons)	Pre-Fire Sediment (t/ac)	Post-Fire Sediment (tons)	Post-Fire Sediment (t/ac)	Sediment Increase
Escondido Canyon	1,150	0.5	2,397	1.0	2.1
Latigo Canyon	407	0.5	6,404	7.9	15.7
Solstice Canyon	1,421	0.5	11,632	4.1	8.2
Corral Canyon	2,150	0.5	19,637	4.6	9.1
Monte Nido (Malibu Canyon)	6,715	0.5	12,745	0.9	1.9

Table 3. Watershed sediment loading estimates for burned area

The Los Angeles County Sedimentation Manual provides detail and analysis methodology for burned watershed sediment loads and uses burned and bulked 50 year return period frequency storm event flows. It cites as much as 120,000 cubic yards of sediment per square mile produced from a major storm impacting a burned watershed. This is

equivalent to about 150 to 300 or more tons per acre depending on the soil density (60 to 120 lb/ft³, 80 lb/ft³ yields 200 ton/ac). The Corral Fire burned areas within the LAC DPW Debris Potential Area 6 (DPA 6), which has a relatively low yield compared to DPA 1 around the area of the Pasadena hills, which is the source of the cited figure. USGS research staff in the field related a sediment load increase potential of up to an order of magnitude above pre-fire levels.

Findings of the On-The-Ground Survey

Resource condition resulting from the fire

The watersheds received moderate to high burn severity as the fire burned from the ignition point near the top of the basin rim towards the coast leaving some patches of light burn possibly due to localized wind patterns and topography. The highest burn severity occurred in the higher elevations of the Corral Creek watershed.

Generally, roads, bridges, and culverts in the burned area were not directly impacted by the fire and their condition does not appear to be degraded due to the fire.

In the Malibu State Park area of the upper watersheds, burn severity ranges from small unburned areas to high severity. The roads in the park consist of dirt roads and hiking trails and are generally in the same condition as prior to the fire. Moderate to severe gully erosion was observed from drainage flows around the rim of the basin.

The Solstice Canyon National Park lies within the burn perimeter and is among the 744 acres of burned National Park Service (NPS) land burned during the Corral Fire. Other park land within the burned area includes 598 acres of California State Park land and 15 acres of Santa Monica Mountains Conservancy land. A majority of the burned area is private land and 91 acres of land held by the City of Los Angeles was also affected.

During this BAER assessment, a preliminary inspection of the burned area was conducted with the following findings:

- The fire burned a majority of the vegetation within the fire perimeter.
- A small amount of baseflow was observed near the basin outlet in Escondido Creek, Latigo Creek, and Solstice Creek, while Corral Creek remained dry during a storm event of about 0.2 to 0.3 inches of rainfall.

- Numerous burned and damaged houses already identified by FEMA were observed. The six houses identified on a road to the east of Latigo Creek about midway up the basin were not found. This narrow section is very steep in the east flank and contains a few residences and a dirt powerline road very susceptible to erosion and has a high potential for landslides. This is verifiable from the historic landslide map available on the Point Dume seismic hazard evaluation report from the California Department of Conservation site
http://gmw.consrv.ca.gov/shmp/html/eval_rpts_so.html.
- Side channel erosion around a wing wall of a drainage channel inlet for flow under the PCH was observed in Latigo Creek.
- A number of culverts and road drainages were not well maintained, and some of them were clogged with soils and debris. They may not be able to handle increased amount of runoff.
- The ditches along some of the roads may not be able to carry the debris flow and may result in localized flooding and debris flows.
- Pre-fire erosion problems were observed in a number of locations within the burned area. The erosion may get worse due to the loss of vegetation.
- A retaining wall was burned along Latigo Rd near the PCH 34° 2' 5", 118° 44' 39", it appeared that local crews are already working to assess and repair it.
- A burned retaining wall along Newall Rd near Corral Canyon Rd.
- Burned metal beam guard rails on Corral Canyon Rd.
- Land slide areas along Barrymore drive. This hazard existed before fire, and the lost of vegetations on the slope may induce more erosion (See geology appendix for additional detail).
- A number of homes in the lower part of the canyons have risks of flooding and debris flow, especially where near to streambeds in a floodplain area.
- A bridge at Solstice Canyon Rd and Corral Canyon Rd was adversely impacted by the fire. At the time of visitation crews had already dammed and diverted existing creek base flow downstream across a roadway lane failure, leaving only one lane operational.
- A small play ground at Seabreeze Rd and Sequit Rd has risk of debris flow and/or rock fall.

III. Emergency Determination

The Corral Fire area suffered moderate to intense burn in a majority of the area of each of the watersheds except Escondido Canyon suggesting high potential for flooding and debris flow during moderate to heavy rainfall events.

Culverts at subbasin outlets and upstream of the PCH will constitute the catchments for all the large debris flow and flooding in each of the canyon watersheds. These may require monitoring and cleaning to avoid clogging and subsequent sheet flow over the highway. Along the south and southwest burn area the debris and flooding will flow down creeks to numerous catchments along their respective watersheds.

There are several moderate to high risk areas in the various smaller watersheds on the south portion of the burn between Escondido Canyon and Solstice Canyon due to steep, highly erosive terrain. Most of the risk involves single-family homes and neighborhoods and property in a somewhat rural, coastal mountain setting.

Residential areas and structures on ridge lines and hilltops may have additional erosion potential on down slope areas that could impact foundation stability if the structures are sufficiently close to steep hill slope grades.

County, State, and National Parkland in the area of the burn may have a higher potential for trails and roads being washed out due to the fire but much of the hazard and erosion existed prior to the fire. These dirt roads and trails have limited access and traffic. The contingency dozer lines in and around the fire area pose a potential for botanical and erosion problems.

State and County dirt roads in the burn area may be in danger of washout from flooding and jamming of culverts with debris flow.

IV. Treatments

Treatments for the burn area will be very difficult because of the topography of the burn area, the location of property throughout the burn area, the fact that many of the symptoms were pre-existing and the likelihood of rain in the coming months.

Localized flooding and sediment flow and accumulation may occur in neighborhood areas below burned watershed areas. Residents should assess and monitor the condition of their properties and review available documents and existing BMPs, perhaps consulting experts and local agencies to properly place sandbags and implement any other measures taken.

Any local water supply transmission mains and laterals in the burned areas should be inspected by local officials to ensure critical supplies

and infrastructure integrity where landslide and other hazards may exist.

Some of the roads in the upper watershed Park areas or steep erodible areas which burned may need realignment and/or relocation as these may be washed out in the event of a debris slide, significant surface runoff or both. Erosion and biological monitoring and control may be needed for the contingency dozer lines and hand cut fire breaks. Where fire suppression and repair work is to be done, local authorities such as Los Angeles County and local fire department staff as well as professionals familiar with proper implementation should be consulted by the land owner. Further detailed investigation by the appropriate qualified professional will be required.

V. Discussion

Expect higher than normal flows with possible debris flow and increased risk of landslides in all rain events in or below burned areas. The higher the rainfall intensity the higher the risk for flooding and debris flow throughout all Corral Fire burned area basins.

All County, Private, and State roads, culverted flows and trails should be safely monitored during rain events.

All other Debris/Sediment/Detention Dams should be monitored during rain events.

VI. References

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Los Angeles County Department of Public Works

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USGS Publications Database

<http://pubs.usgs.gov/wri/wri934076/stations/11075800.html>

DRAFT TECHNICAL SPECIALTIST' REPORT

Burned Area Emergency Response Report

Resource: Wildlife

Fire Name: Corral Fire CA-LAC-259483

December 2007

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Resource Setting

The 4,709-acre Corral fire burned four drainages (Latigo Canyon, Solstice Creek, Dry Creek, and Corral Creek) within the Santa Monica Mountain system, in Malibu, California. The drainages are ephemeral (Latigo Canyon, Dry Creek, and Corral Creek) and perennial (Solstice Creek) creeks. The habitat types within the burn area include: coastal sage scrub, oak woodlands, riparian and mostly nonnative grasslands. Land ownership impacted by the Corral Fire include: California Department of Parks and Recreation (State Parks [Malibu Creek State Park]), National Park Service, Santa Monica Mountain Conservancy, City of Los Angeles, and private land.

I. Potential Values at Risk

This report assesses the effects of the Corral Fire and the proposed effects of the Burned Area Emergency Response (BAER) treatments on wildlife species and their habitats. California Department of Fish and Game's California Natural Diversity Database (CNDDB) and Biogeographic Information and Observational Systems (BIOS) data base searches indicated no federal or state threatened or endangered wildlife species within or immediate surrounding the burn area. The table below (Table 4) describes sensitive and/or important wildlife species with the potential to occur within the Corral Fire perimeter and their state and federal status.

II Resource Condition Assessment

Resource Setting

The Corral Fire burned from the foothills of the Santa Monica Mountain Coastal range down to near sea level. The impacted habitats can be described as coastal sage scrub, native and nonnative grasslands, oak woodlands, and riparian. Lower montane mixed chaparral and chamise chaparral dominate the higher elevation foothills, descending into dense oak/sycamore dominated riparian corridors of the drainages. Wildlife species impacted by the Corral Fire include: coastal sage scrub species, chaparral species, and riparian species.

Table 4 – Sensitive Wildlife Species

Common Name	Scientific Name	Status	Comments
Two-striped garter snake	Thamnophis hammondi	Species of Concern	Resident
Southwestern pond turtle	Clemmys marmorata	Species of Concern	Resident
Western spadefoot toad	Spea hammondi	Species of Concern	Resident
White-tailed Kite	Elanus leucurus	Fully Protected	Resident (and oak)
Northern Harrier	Circus cyaneus	Species of Concern/ Raptor Species	wetland/grassland sp.
Sharp-shinned Hawk	Accipiter striatus	Raptor Species	Wintering
Red-tailed Hawk	Buteo jamaicensis	Raptor Species	Resident (generalist)
Red-shouldered Hawk	Buteo lineatus	Raptor Species	Resident
American Kestrel	Falco sparverius	Raptor Species	Resident
Barn Owl	Tyto alba	Raptor Species	Resident
Great Horned Owl	Bubo	Raptor	Resident

Bobcat	virginianus Lynx rufus	Species mesopredator	Resident
Dusky Footed Wood Rat	Neotoma fuscipes	Species of Concern	Resident
Mountain Lion	Puma concolor	Fully Protected	Transient
Mule Deer	Odocoileus hemionus californicus	State managed Game species	Resident

Findings of the On-the-Ground Survey

Resource condition resulting from the fire

Upland Habitat

The coastal sage scrub habitat generally burned at a high severity throughout the fire, with a mosaic of moderate to low burn patterns. Chaparral habitat of the Santa Monica foothills on the eastern and southern portions of the fire burned at a high severity.

Riparian Habitat

Corral Creek: Approximately 75 percent of the Corral Creek watershed burned from the headwaters down to about one-half-mile from the creek mouth with a moderate to high severity. The riparian corridor at the drainage mouth burned at a low severity, leaving it mostly intact. The steep banks at the upper portion of the drainage and the high burn severity in the upper portion of the watershed will likely contribute to a substantial sedimentation and debris flows into the creek channel. Standing water was observed in the head waters of Corral Creek during the survey.

Solstice Creek: The entire Solstice Creek watershed was heavily impacted by the Corral Fire. The upper watershed of Solstice Creek and the associated riparian habitat burned with a moderate to high burn severity. The lower portion of the watershed burned at a low severity with patches of moderate severity mixed throughout. Heavy ash (due the severity of the burn in this area) and sedimentation, as well as the steepness of the canyon, will likely contribute to substantial sedimentation and debris flow into the creek channel. Ash and sedimentation was visible on the standing water in the creek during the November 29, 2007 survey. Access and safety issues restricted surveys further up the drainage.

Potential Consequences of fire on values at risk

Based on the CNDDDB and BIOS data base searches indicated no federal or state threatened or endangered wildlife species within or immediate surrounding the burn area. The Corral Fire burn area was surveyed over a three day period (November 28, 29, and 30, 2007). Surveys included: wildlife assessment, riparian health assessment, drainage and upland burn severity assessment, and sedimentation and debris load prediction.

Upland Species

Most bird species recover quickly from fire as coastal sage scrub typically recovers within one to five years after the fire impact. Additionally, the late season Corral Fire had no direct impacts on nesting or breeding bird species, as all coastal sage scrub species are spring breeders.

The highest direct mortality of fires through this type of habitat occurs in reptiles. Species such as western diamond back, gopher snake, king snake and patch-nosed snake, as well as, several sage scrub lizard species are unable to retreat quickly enough and likely sustain direct mortality as a result of the fire.

Mountain lions, deer, and mesopredators including bobcat, coyote, and grey fox will typically survive the initial fire event, escaping into the surrounding unburned habitat, although direct mortality could occur. The Corral Fire was a relatively small fire (4,709 acres) and the impacted area is surrounded to the north, west, and south by unburned high quality upland habitat that will likely serve as a refuge for the larger mammals that escaped the direct impact of the fire. As food resources (vegetation and small mammals) begin to recover in the burned area it is likely that mountain lion, deer, and mesopredator populations will rebound here as well. While upland fires in Southern California heavily impact the limited wildlife corridors by removing vegetation cover, the small fire footprint and the amount of unburned habitat surrounding the burn area will likely not significantly impact wildlife movement.

Riparian Species

Most of the riparian corridors within the burn area burned at a moderate rate leaving many standing oaks and sycamores, with scorched crowns. The riparian corridors support essential nesting habitat for a large number of bird species including several birds of prey (raptors). While it is not possible at this time to determine which trees within the drainages survived, it appears that a large majority of the nesting habitat will be available for the large number of riparian birds, including raptor species in the spring. It is uncertain how many of these

species will return to the riparian corridor during the spring to nest due to the impacts of the surrounding forage area.

Many small mammal species also receive a high direct mortality due to fire. Dead specimens of deer mouse, pocket mouse, and the dusky-footed woodrat were all observed during the survey period. The direct mortality of small mammals and the destruction of forage habitat will likely impact the rate at which this group recovers. However, the small burn area and the surrounding unburned refuge habitat will assist in the recovery process.

Riparian reptile and amphibian species such as southwestern pond turtle, western spadefoot toad, and two-striped garter snake survivorship depended on the severity of the burn in the riparian drainages. Most of the Corral Fire drainages burned at a moderate severity, but the majority of the surrounding coastal sage scrub habitat burned at a high severity. The combination of the severity of the burn and slope aspect will likely contribute a large amount of sedimentation and debris into the drainages. These post fire sedimentation events following seasonal rains could result in further mortality of riparian amphibian and reptile species due to debris smothering or habitat loss. Because pond turtles depend heavily on pools of standing or slow moving water, they are particularly susceptible to habitat loss due to heavy sedimentation.

III Emergency Determination

The impacts to natural resources described in this report do not constitute life threatening emergency based on the lack of threatened, endangered, and/or sensitive species impacted by the fire. However, it is important to increase the understanding of drainage and habitat impacts due to catastrophic events such as fire. The monitoring of stream habitat and sedimentation deposition assessment would increase the level of understanding of drainage recovery and steer proper restoration management practices. Similarly, post fire monitoring of coastal sage scrub and oak woodland communities would assist in how these habitats recover as well.

IV Treatments to Mitigate the Emergency

While this section does not describe an emergency as defined by the Federal Emergency Determination, there are still methods and treatments that can be used to minimize the effects and potential impacts of the fire. These are described below.

A. Treatment Type

Methods of treatments for burn areas include:

- Implement appropriate BMPs upstream of sensitive riparian habitats to minimize sediment load.
- Conduct revegetation efforts where appropriate to promote rapid recovery of native habitats.
- Conduct post fire population surveys for wildlife species.
- Conduct long-term monitoring of key species to document long-term population trends as a result of the fire.
- Coordinate local agency activities during maintenance activities to avoid, minimize, and mitigate additional impacts to species.

B. Treatment Objective

The treatment objectives are to monitor wildlife populations and encourage adaptive management of sensitive wildlife species.

Erosion Control

- Stabilize slopes over between 20 and 50 percent, where feasible, with biodegradable matting to limit slope erosion while also limiting impacts to recovering native vegetation and wildlife habitat.
- Avoid use of hydromulching on slopes greater than 50 percent. Avoid hydroseeding as it inhibits natural recruitment from the native seed bank, and increases introduction of exotic weed species into the native habitat.
- Vegetation important to sensitive species, especially unburned habitat in known nesting or foraging territories, should be avoided to the greatest extent feasible.

Vegetation clearing should be limited to smallest area feasible to accomplish activities safely. Vegetation important to sensitive species, especially unburned habitat in known nesting or foraging territories, should be avoided to greatest extent possible. Please see Hydrology/Engineering BAER report for further details.

Revegetation of Native Habitat

- Revegetate riparian habitats in burn areas to encourage habitat regrowth. Riparian vegetation will promote soil stabilization as well as provide refugia for wildlife species. Natural revegetation is expected to occur with the same native species that occurred before the fire.

Population surveys and long term monitoring

- Conduct long-term small mammal monitoring throughout the burn area to evaluate mortality rates from the fire.
- Monitor mountain lion, deer, and -mesopredator populations and movement patterns in the burn area to monitor use of habitat and population size and health.
- Conduct long-term monitoring of raptor species throughout the burn area to determine post-fire populations.
- The Wildlife Agencies, including Department of Fish and Game and U.S. Fish and Wildlife Service should be consulted regarding the protocols and season of wildlife surveys.
- Document unburned habitat and monitor for use of sensitive species.

Local agency Coordination

- Local agencies and jurisdictions should coordinate activities with State Parks and Wildlife Agencies to avoid, minimize, and mitigate impacts to sensitive species during post-fire recovery efforts.
- Coordinate local jurisdiction and private landowner activities within riparian areas to address wetland permitting including, but not limited to Department of Fish and Game, Regional Water Quality Control Board, and U.S. Army Corps of Engineers.
- Resource Agencies including Department of Fish and Game and U.S. Fish and Wildlife Service should be consulted regarding the suite of species, appropriate vegetation protocols, and season for re-vegetation efforts.

DRAFT TECHNICAL SPECIALIST'S
Burned Area Emergency Response Report

Resource: Fisheries

Fire Name: Corral Fire CA-LAC-259483

December 2007

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I. Resource Setting Assessment

The 4,709-acre Corral fire burned a total of four drainages (Latigo Canyon, Solstice Creek, Dry Creek and Corral Creek) within the Santa Monica Mountain system, in Malibu, California. The drainages are ephemeral (Latigo Canyon, Dry Creek and Corral Creek) and perennial (Solstice Creek) creeks. All four drainages, from the headwaters to the coast were contained within the perimeter of the Corral Fire. The creeks varied in gradient from low (Corral Creek and Dry Creek) to high (Solstice and Latigo Creek). The fire impacted City, State, National Parks and private land.

The native fisheries component of the described drainages includes; California tree frog, two striped garter snake (State species of special concern (SSSC)) western toad, California newt (SSSC) and possibly western pond turtle (SSSC). Additionally, Solstice Creek and Corral Creek have had historic Southern Steelhead presence (up until the 1940's).

The non-native fisheries component of the described drainages includes; mosquito fish and New Zealand mud snails (Solstice Creek).

Survey Methods:

To evaluate the risk to natural resources within the creek system, visual and in-creek surveys were conducted on November 28th, 29th, and 30th. All drainages within the burn area were surveyed for burn intensity and the potential for sedimentation issues. These parameters were examined on how they would possibly impact the native fisheries component of the drainage.

Post fire inspections of the creeks were conducted where access and safety concerns allowed. The values at risk are temporary habitat alteration due to excess sedimentation flows, and slope-generated landslides, debris flows, rock fall, and associated slope movement.

General Observations:

The principal drainage concerns generated by the Corral Fire are temporary habitat alteration due to excess sedimentation flows, and slope-generated landslides, debris flows, rock fall, and associated slope movement. All drainages sustained heavy riparian damage that ranged from a burn severity of medium to high. All four drainages sustained a high burn severity on a high percentage of the areas outside the riparian zone. The steepness of the drainages and the burn severity documented around the creek will likely result in heavy sedimentation and debris flow into the creeks, resulting in aquatic habitat alteration.

II. Potential Resources at Risk:

Two main drainages impacted by the Corral Fire were Corral Creek and Solstice Creek. Both drainages are formed as water courses off the Santa Monica Mountain range located north of Malibu. Solstice Creek is a historic southern steelhead creek, with routine spring runs present in as recent as the 1940's. Corral Creek has had anecdotal steelhead sightings in the recent past, but neither of the drainages is currently occupied by southern steelhead trout. Two other creeks (Dry Creek and Latigo Creek) were also heavily impacted by the Corral Fire. Both were dry at the time of the survey and data base (NDDDB and Bios) searches revealed no sensitive species within these drainages.

Due to the historic presence of southern steelhead in Solstice Creek, several restoration projects involving in-creek barrier removals are currently on-going. These barriers impede upstream migration of steelhead trout and it is thought that their removal will facilitate the return of steelhead trout into Solstice Creek. Solstice Creek also has a population of the invasive New Zealand mud snail present in the lower stretch of the creek. This exotic snail quickly out-competes other aquatic invertebrates for primary resources. Proper decontamination protocols should be followed immediately following any contact with the bed, banks or wetted portion of Solstice Creek (see attached New Zealand mud snail decontamination protocol)

Aquatic species list for Solstice Creek:

California Tree frog (*Pseudacris cadaverina*)

Two-striped garter snakes (*Thamnophis hammondi*) (CSSC)

California Newt (*Taricha torosa*) (CSSC)
Western toad (*Bufo boreas*)
New Zealand mud snail (invasive exotic)
Mosquito fish (*Gambusia affinis*) (exotic)

Corral Creek is an ephemeral drainage located approximately ½ mile east of Solstice Creek. Despite anecdotal sightings of steelhead in Corral Creek, no documented sightings of southern steelhead exist for this drainage. The lower stretch of Corral Creek remains dry for most of the year, with partial year-round water available near the head waters of the creek. Surveys for Corral Creek were conducted from the fire perimeter due to the steepness of the canyon, access and safety issues.

Aquatic species list for Corral Creek:

California tree frog (*Pseudacris cadaverina*)
Two-striped garter snake (*Thamnophis hammondi*) (CSSC)
California Newt (*Taricha torosa*) (CSSC)
Western toad (*Bufo boreas*)
Mountain king snake (*Lampropeltis zonata*)
Western pond turtle (*Clemmys marmorata*) (CSSC)

No federal or State threatened or endangered aquatic species occupy Solstice or Corral Creek.

III. Resource Condition Assessment

NDDB (National Diversity Data Base) and Bios data base searches indicated that Solstice Creek and Corral Creek do not contain native fish species. The data base search also indicated that no federal or state threatened or endangered species occupy the two drainages. Solstice Creek is a low gradient, steep canyon perennial creek with aquatic habitat. Corral Creek is a low gradient, ephemeral creek, with marginal aquatic habitat in the lower section, and permanent water and a slightly steeper gradient in the upper section. Both drainages were surveyed over a three day period (November 28th, 29th and 30th, 2007). Surveys included: riparian health assessment, drainage burn severity and sedimentation and debris load prediction.

Findings of On-The-Ground Surveys

Corral Creek: Approximately 75% of the Corral Creek area burned, from the headwaters down to about ½ mile from the drainage mouth. The drainage burned with a moderate to high burn severity, with most of the riparian zone receiving moderate to high scorching. The riparian zone appeared scorched but intact. The steep banks at the upper portion of the drainage and the high burn severity in the upper portion of the watershed will likely contribute to a substantial sedimentation and debris flow into the

creek channel. No native fisheries issues are present within this creek. Standing water was observed in the head waters during the survey.

Solstice Creek: The entire Solstice Creek water shed was heavily impacted by the Corral Fire. The Solstice drainage burned with a moderate to high burn severity, with most of the riparian zone receiving moderate to high scorching. Some areas just below the Keller House were completely burned at a high severity. Heavy ash (due the severity of the burn in this area) and sedimentation, as well as the steepness of the canyon, will likely contribute to a substantial sedimentation and debris flow into the creek channel. Ash and sedimentation was visible on the standing water in the creek during the November 29th, 2007 survey. Access and safety issues restricted surveys further up the drainage.

Fire Consequences:

The loss of surrounding vegetation in and around drainages due to fire can have serious consequences to the watershed. Depending on the fire severity, vegetative debris, heavy ash, silt and sediment will travel down slope and collect in the drainage. This debris field will collect in drainage pools and may destroy habitat. The water quality in the impacted drainages will likely severely decline, increasing pH levels and lowering dissolved oxygen levels impacting aquatic communities. Fires also release pollutants that are normally found in soil and living and decaying plants that are washed into streams during run off events.

High water events are usually more severe and violent after a fire, as the water volume travels unimpeded down the drainage, scouring the stream bed and destroying the stream community. These high water events will wash boulders and fire debris into the creek again greatly reducing the habitat quality. The severity of the post fire impacts on drainages depend on two things: fire severity on the surrounding bank habitat and riparian zone, and the frequency and intensity of rain events immediately following the fire event.

IV. Emergency Determination

As it relates to life, property and immediate negative impacts to fisheries resources, the issues described in this report do not constitute an emergency. However, despite the lack of sensitive fisheries issues, it is important to increase the understanding of drainage impacts due to catastrophic events such as fire. The monitoring of stream habitat and sedimentation deposition assessment would increase the level of understanding of drainage recovery and steer proper restoration management practices.

V. Treatment to Mitigate the Emergency

While this section does not describe an emergency as defined by the Federal Emergency Determination, there are still methods and treatments that can be used to minimize the effects and potential impacts of the fire.

VI. Discussion

The Corral Fire heavily impacted four drainages (Latigo Creek, Dry Creek, Solstice Creek and Corral Creek) located in the Santa Monica Mountain Range. The riparian zone of each described creek burned at a medium to high severity, with a majority of the surrounding habitat outside the creek zone burning at a high severity. This intense event contributed a high amount of ash and potential debris that will ultimately fall or wash into the drainages. While this increase in sedimentation and debris load will likely temporarily alter stream flows and pool habitat, and negatively impact water quality, research on long term effects are promising.

Recent research has shown that fire and seasonal rain have no significant impact to drainage health or aquatic habitat (Spina and Tormey, 2000). This research was conducted on nearby Malibu Creek following the 1993 fire event and showed subsequent rainfall immediately following the fire revealed no significant sedimentation deposition within the creek over a two-year period. Debris flow into the creek was also less than significant following the fire and did not have an adverse impact on the resident population of steelhead trout located in the lower portion of the creek. The conclusions of the researchers were that no management action was needed to mitigate the effect of sediment deposition on pool habitat due to fire.

Research of this nature becomes important in understanding drainage recovery following fire events. It is important, even in smaller creeks and streams that may not contain sensitive species, to increase the baseline information of drainage impacts due to catastrophic events such as fire. Similarly, data gathered documenting the adaptation and recovery of sensitive species to fire and post fire water events may steer future management actions. Post fire monitoring and analysis of the drainage and how they recover, will assist in management practices in the future.

As far as aquatic species, a thorough data base search using NDDDB and Bios clearly showed that no sensitive aquatic species were located within the Corral Fire perimeter. Additional personal communications with State Parks and National Parks Service personnel confirmed the data base findings. Sensitive wildlife issues were also absent within the fire area and similarly confirmed through the data base searches and Parks personnel communications.

While sensitive species are not documented and were not recorded during the Corral Fire surveys, an exotic, invasive species located within the fire perimeter

is worthy of note. The New Zealand mud snail has recently been discovered in Solstice Creek. The mud snail is an introduced species and once it is established, it can have a devastating impact on the aquatic ecosystem. It will also drastically alter primary production in stream systems and negatively impacts native species and fisheries. The presence of the New Zealand mud snail in Solstice creek further contemplates any potential sedimentation and debris monitoring within this drainage. This invasive snail is easily transferred from creek to creek on gear (waders, nets or tools) through passive transfer. To avoid further infestation of Solstice Creek or any other drainage, see the recommendations section regarding this species.

VII. Recommendations

While no sensitive species exist in Solstice Creek or Corral Creek, I recommend that sedimentation and debris monitoring within the drainages be conducted to increase the knowledge base for aquatic system recovery following these catastrophic events. I also recommend that post fire monitoring of the effected areas be conducted using existing monitoring stations installed by USGS (currently in Malibu Creek). These assessments should include water quality (pH, dissolved oxygen, turbidity and temperature), stream habitat monitoring and sedimentation deposition assessment. The data collected would increase the level of understanding in determining the proper management practices for future post fire issues.

A. New Zealand mud snail

Conducting any type of post fire assessment within Solstice Creek, presently infested with New Zealand mud snails, I strongly recommend that all personal equipment (boots, gloves, and tools) be brushed of mud and debris and rinsed with a bleach solution (20% bleach to 80% water). Personal equipment is to be cleaned on a daily basis when working in Solstice Creek and uniforms and clothing can be cleaned off-site (laundered and dried). The bleach solution must be disposed of in an approved and permitted manner. These steps will help minimize the possibility of spreading the invasive mud snail.

References

Spina, A. P., and D. Tormey. 2000 Post fire Sediment Deposition in Geographically Restricted Steelhead Habitat. North American Journal of Fisheries Management 20:562-569, 2000.

DRAFT TECHNICAL SPECIALIST'S
Burned Area Emergency Response Report

Resource: Botany

Fire Name: Corral Incident CA-LAC-258567

December 2007

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I. Potential Values at Risk

The Corral Fire burned many different vegetation communities on a combination of Federal, State, County and private land. Fire is a natural and necessary occurrence in areas that have these types of vegetation. These natural landscapes typically recover well after fire if left alone. However, wild-land fires in the last several decades have been occurring more frequent than the natural rate due to modern human causes. This more frequent wildfire rate in the presence of non-native and invasive plant species (weeds) introduced by modern human activities is changing the natural landscape in a significant and deleterious way. Weed species spread more rapidly for there are no limiting biological restraints controlling their populations as in their native ranges. These weeds respond well to fire and their spread invades and degrades the entire community towards a new and less diverse ecosystem. This mix of persistent non-native plants and a decreased number and kinds of native plants negatively effects the fauna that depends on them, further changing the native ecosystem functions. This change of vegetation is termed a "type conversation". Type conversation has been documented on nearby lands and is continuing to spread. Erosion from unnatural disturbances such as road construction and fire breaks is an important contributing factor in the introduction and subsequent spread of wildland weeds onto landscapes.

All the plant communities are at various levels of risk due to 1) the different species of weeds that are present and are able to invade the different native communities, 2) unnatural erosion features that only increase in size thereby eroding away soil holding native plants thus decreasing habitat and increasing weed seed introduction, and 3) increasing fire frequency. Vegetation type conversion is inevitable unless actions are taken to mitigate. The immediate post fire period is the best window of opportunity to begin such mitigation because of the unfettered view and access to newly germinating weeds on the landscape and lack of collateral damage to native species during treatments.

Three plant species of note are listed below in table 5. Additionally, there is one very rare plant community association in Solstice Canyon. The white alder-sycamore and walnut woodland association is very notable. It is one of four or less such associations known in Southern California.

Table 5. Rare, Threatened and Endangered Plants in the Corral Fire Area*

Scientific Name	Common Name	Location within Fire
Baccharis malibuensis	Malibu baccharis	Solstice Canyon – Nat'l Park Service
Pentachaeta lyonii	Lyon's Pentachaeta	Solstice Canyon – Nat'l Park Service
Deinandra minthornii	Santa Susanna Tarplant	Upper Corral Canyon- Malibu Crk. St. Park

* None of these species are expected to be in peril if no weed species are present.

This report will focus on non-native plant species and human related erosion and erosion routes from weed infested areas and soil/habitat disturbance from dozer activities. Contingency fire lines were dozed in response to the fire and much of the dozed lands are on property set aside as public lands for the preservation of native habitat. Therefore, this report will include impacts to plant communities on those lands outside the burned area as well as within.

II. Resource Condition Assessment

Resource Setting

The 4,709 acre burn area is dominated by wildland vegetation. Of this, 68% or ~3,209 acres are on private land (see Appendix A). The remaining 32% is ~1,500 acres of public land preserved for its native habitat. Outside the burn area an additional ~500 acres of adjacent (SE corner of Burn Area) with newly dozed contingency lines is state owned and managed by the Malibu Recreation Conservancy Authority (MRCA). A contingency line located to the west, also outside of the Corral Burn Area, cut through ~1/2 mile of Nat'l Park Service (NPS) land, the Santa Monica Mountains National Recreation Area (SMMNRA).

The burn area has within its boundary many different plant alliances and associations (Keeler-Wolf) that have been generalized by NPS into 8 vegetation types (see Appendix B): Coastal Sage Shrub types, 458 ac; Chaparral types, 3259 ac; Upland tree types, 422 ac; Disturbed vegetation types, 184 ac, Urban/Disturbed types, 179 ac; Riparian woodland types, 138 ac; Prairie/Meadows types, 54 ac; Rock outcrop types, 7 ac; and exotic/invasive types, 4 ac. This category of exotic/invasive types category does not reflect the total acreage where

such plants exist and affect the ecosystem but only solid stands of non-native plants. Appendix C is a map showing locations for 16 weeds within the burn area and adjacent land most notable is MRCA reserve noted in the previous paragraph as an area with the dozed contingency line.

Survey Methods

Field assessments were accomplished by driving access roads in and around the burn area and hiking from those locations where such access was necessary. Notes and several photographs and GIS waypoints were taken. Binoculars and various types of maps were used to view and interpret the landscape and features of importance. Field trips were made Nov. 28, 29, 30 and Dec. 2 and 3, 2007. Additional trips (6), and follow-up telephone calls to gather information on the resources were made to the National Park Service for the SMMNRA in Thousand Oaks and to the California State Park Angeles Regional office at Malibu State Park in Calabasas.

Findings

Corral Fire contingency lines were dozed to the west and east outside of the burn area (see Appendix D). To the west approximately ½ mile of the dozed line is on National Park Service land. At the eastern site nearly 1.5 miles were dozed on Malibu Recreation Conservancy Authority land which is state owned land for wildland preservation. Invasive weeds have been mapped by the NPS at these sites. Dozer disturbance increases erosion, spread invasive weeds into natural areas and transports weed seeds to other locations. The dozer line that begins at the MRCA Corral Canyon trail head (sign marked as Santa Monica Mts. Conservancy) off PCH has no water bars installed at the time of this report. On Malibu Creek State Park land a new dozed road was installed at the intersection of Puerco Motorway and Mesa Peak Mountain Way (Mtwy).

Several wildland weeds were observed along the road/dozer line through State Park land that starts at Corral Cyn. Rd. to Mesa Peak Mtwy/Puerco Mtwy junction. The local NPS plant ecologist provided a Corral Fire weed map (appendix C) indicating the presence of several weed species within the burn area and adjacent lands, most importantly the MRCA land where contingency lines were dozed. A visit to Solstice Canyon discovered a greater number of species present (in the unburned portions) than have been previously recorded for the area.

Additionally, it was noted that throughout the area along roads, roadside and commercial and residential landscapes several species of invasive

weeds are present in large numbers and continue to spread. The fire will encourage the spread of these weeds both in the landscaped areas and onto the wildlands. It noted that along PCH large infestations of escaped African fountaingrass, Pennisetum setaceum, had grown onto the steep rocky slopes and cliffs and carried the fire across the rock faces. This was also noted at the recent Canyon Fire.

Table 6. Invasive Weeds Observed In and Adjacent to the Corral Fire, *in NPS weed map of the Corral Fire perimeter and not seen by investigator.

Scientific Name	Common Name
Euphorbia terracina	Geraldton carnation weed
Ehrharta sp.	An African vedt-grass
*Arundo donax	Giant reed
Bidens pilosa	Common beggar-ticks
Centaurea melitensis	Maltase star thistle, tocolote
Centaurea solstitialis	Yellow Star Thistle
Conium maculatum	Poison hemlock
Cortaderia jubata	Jubata grass
*Cyperus involunrata	African umbrella plant
Foeniculum vulgare	Wild Fennel
Malva parviflora	Small mallow
Marrubium vulgare	horehound
Nicotiana glauca	Tree tobacco
Pennisetum setaceum	African fountain grass
Piptatherum miliaceum	Smilo grass
*Phalaris aquatica	Harding grass
Phoenix canariensis	Canary Island date palm
Picris echioides	Bristly ox-tongue
Rumex crispus	Curly dock
Salsola tragus	Russian Thistle
Spartium junceum	Spanish Broom
Silybum marianum	Milk thistle
Ricinus communis	Castor Bean
Avena sp.	Oat
Brassica Nigra	Black Mustard
Hirschfeldia incana (Brassica geniculata)	Small-podded mustard
Bromus spp.	Annual Grasses
*Vinca major	Greater periwinkle

III. Emergency Determination – A Natural Resource Emergency –

The fire suppression and rehabilitation efforts have the potential to introduce and spread weed populations. Weed species are opportunistic and are effective at becoming established in disturbed soils, effectively displacing native habitat for there are no natural inhibiting organisms like those in their native lands. The introduction of these weeds will likely affect the structure and function of the native plant communities and their ability to recover to various degrees. Several weed species were observed occurring within the Corral Fire area (Table 6). Not all observed weed species are listed. The burn obscured the presence of many weeds and their locations. Invasive weeds exist along roads and fuel breaks.

This burn, coupled with a highly altered (more frequent) local fire regime and erosion features from roads/trails will likely favor the establishment and spread of exotic weed species over large portions of the burn area. This is vegetation type-conversion and it is documented as occurring in the area.

IV. Treatments to Mitigate the Emergency

Specific Recommended Protection Measures

The following measures are proposed to mitigate specific problem locations identified in the field. These locations have also been noted by the professional staff responsible for the care and maintenance of these lands as problem sites. Land in private ownership is not discussed.

The ~1.5 miles of contingency line on MRCA state land near PCH constitutes a significant disturbance to habitat. Dozer lines to be treated by pulling outside berms back into the control line, re-contouring or out-sloping the surface to allow for drainage, and where necessary, placing water-bars in the control line. Water bar specifications should be of standard practice and monitored by an appropriate local agency knowledgeable in these rehabilitations.

Adequate monitoring and weed abatement for an invasive species noted in the area (Appendix D), especially Euphoria terracina for three years. No seeding should be done on the dozer line on the MRCA land.

The ~0.5 miles of dozed contingency line west of the burn area on SMMNRA (NPS) land needs to be addressed in the same way as the above described manner for the eastern contingency line.

With consultations with staff from the Malibu Creek State Park, rehabilitation of dozer lines along the northern border of the burn area and the recently highly modified junction at Mesa Peak and Puerco Mtwy needs to take place.

Such consultation should include post-burn rehabilitation of the road to the old home site near the junction of Corral Cyn. Rd. and Mesa Peak Mtwy.

The entire burn area and contingency lines on government land should be surveyed by a competent botanist at the start of the next growing season to locate and assess any weed populations for immediate treatment. Adjacent, private lands in the burn area should be grossly surveyed to identify weed populations that could spread onto the public lands. Appropriate actions would be to document, monitor and/or treat with landowner permission.

The locations of the three plant species of concern (Table 5) should be surveyed to check on their population health and the presence of weeds. The rare plant community in the riparian zone of Solstice Canyon consisting of white alder-sycamore and walnut woodland also needs such monitoring. Appropriate weed abatement activities should be started during the first growing season if necessary.

General Recommended Protection Measures

The following are general recommended protection measures for the burn area to mitigate the impact of the burn on sensitive plant communities and impacts to rare, threatened, and endangered plant species resulting from fire suppression activities.

Consult with the environmental staffs of the NPS, State Parks and MRCA regarding the following protection measures.

Conduct an immediate survey for weed populations and begin treatments in specific appropriate locations (e.g. Solstice Cyn.) for the highest priority Species (e.g. Euphorbia terecina, Lepidium latifolium) in late winter 2008 before weeds can reproduce.

Conduct annual weed mapping to determine any type conversion from native habitat to weed dominated habitat after the fire. Develop an eradication program for any areas where weeds are inhibiting natural post fire recovery of native habitats.

Seeding/hydroseeding of the burn area should not be conducted. Studies have shown that native vegetation should recover rapidly after the fire, without any further treatment (Keeley, 1977). Introduction of non-local "native" seed may alter or genetically dilute the phenotypes suited for the local ecotype. Seeding may change the dominance of species within a habitat type thereby altering the density, structure, and function of the habitat for local wildlife (food, breeding, cover, etc.) (Keeler-Wolf, 1995). Artificial seeding with any species often does not produce significantly better results than allowing natural vegetative recovery (CNPS, 1995).

Mulch should not be applied to open space areas within the burn area. Mulch may introduce weed seed as well as suppress germination and growth of native species.

Weed-free mulch or hydromulch could be appropriate on newly disturbed soils/subsoils on fire breaks only if no other erosion control work will be done on these sites.

Fire breaks need better erosion control structures installed than the dozer installed waterbars, many of which were installed incorrectly. Use of straw waddles, jute/rock check dams, coir nets, jute fabric, straw-punching and hand tool surface modifications are some appropriate treatments. Weed monitoring and treatments are important on these sites.

Fire break line use or potential locations should be discussed with the agencies upon whose lands they may be constructed before fire events. When fire events occur there needs to be a communication system in existence that will be used to contact the appropriate contact person(s) before the dozers are on site working.

Educational trainings and discussions regarding proper fire break construction and post-fire rehabilitation should be organized between the fire agencies that most likely would be charged with contingency line construction and those agencies charged with the protection of the land upon which those lines may be placed. Such activities should include videoed field trainings and the development of a Best Management Practices manual on how to do such "light-on-the-land" work. These meetings should be planned and executed as soon as possible before the next fire event.

Fire break line construction, if at all possible, should have a resource specialist on site as a consultant or at least informed that such work is being conducted in their absence.

Dozer operators should have GPS units running to track their operations accurately. Additionally, they should be tracked when they move to other locations because they probably will be carrying and dispersing invasive weeds and possibly other non-native species.

Dozer operators should have their equipment cleaned to help prevent not only the spread of weed species but non-native invertebrates (insects, New Zealand mud snail, etc.).

Firebreaks after their construction or refreshing of old lines to be monitored by some official agency for the presence non-native weed species. Any found

need to be treated in a timely manner the first growing season before they reproduce and cause a more costly future problem.

Road drainage systems need effective energy dissipating structures installed at their outflow end to minimize unnatural erosion on wildland soils. This is especially important in a post-fire rain event. Most erosion gullies warrant the installation of multiple, permeable check dams to begin a filling process of the gullies with sediment during rain events. All these areas need weed monitoring.

Landowners in and near this and the nearby Canyon Fire need to be informed of the environmental hazard of having invasive plants in residential, commercial and public landscaping. Living next to land protected for its natural heritage carries with it a community responsibility to those living and working in and near such lands. The California Invasive Plant Council (www.cal.ipc.org) has a list of alternative plants to replace commonly used horticultural, invasive plants. A Southern California Version of "Don't Plant a Pest" pamphlet is available and efforts to distribute this and other related educational information is strongly encouraged. The city of Malibu should consider ways to distribute such information within its city limits.

People living and working nearby should receive information regarding the relationship between wildfires and wildland weeds. An excellent 4 page pamphlet, "Invasive Plants and Wildfires in Southern California" by the University of California is available for distribution. Go to www.wildfirezone.org.

V. References

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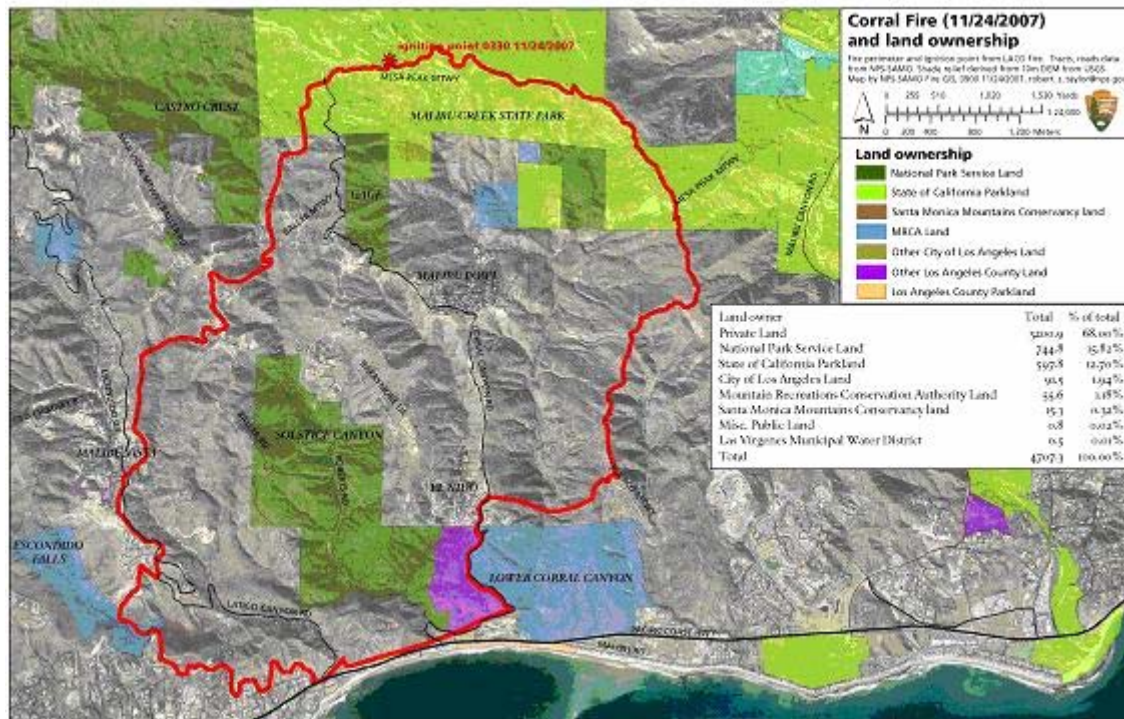
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MacDonald, Lee H. and Robichaud, Peter R., July 23, 2007, JFSP Final Report: Postfire Erosion and the Effectiveness of Emergency Rehabilitation Treatments over Time, BLM agreement/task order number: 1422RAH03-0014, JFSP project number: 03-2-3-22

Botanical Appendix A

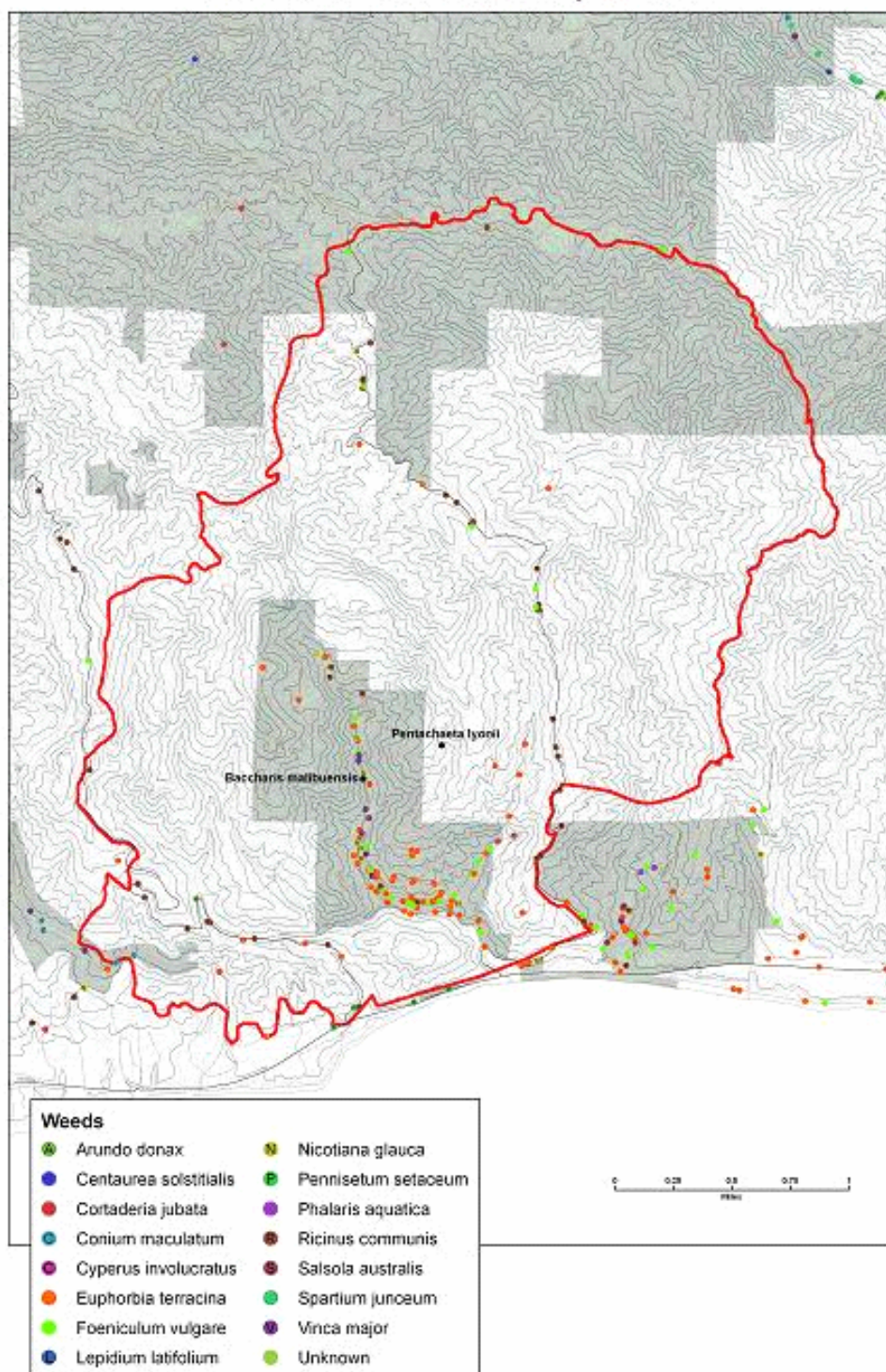


Botanical Appendix B

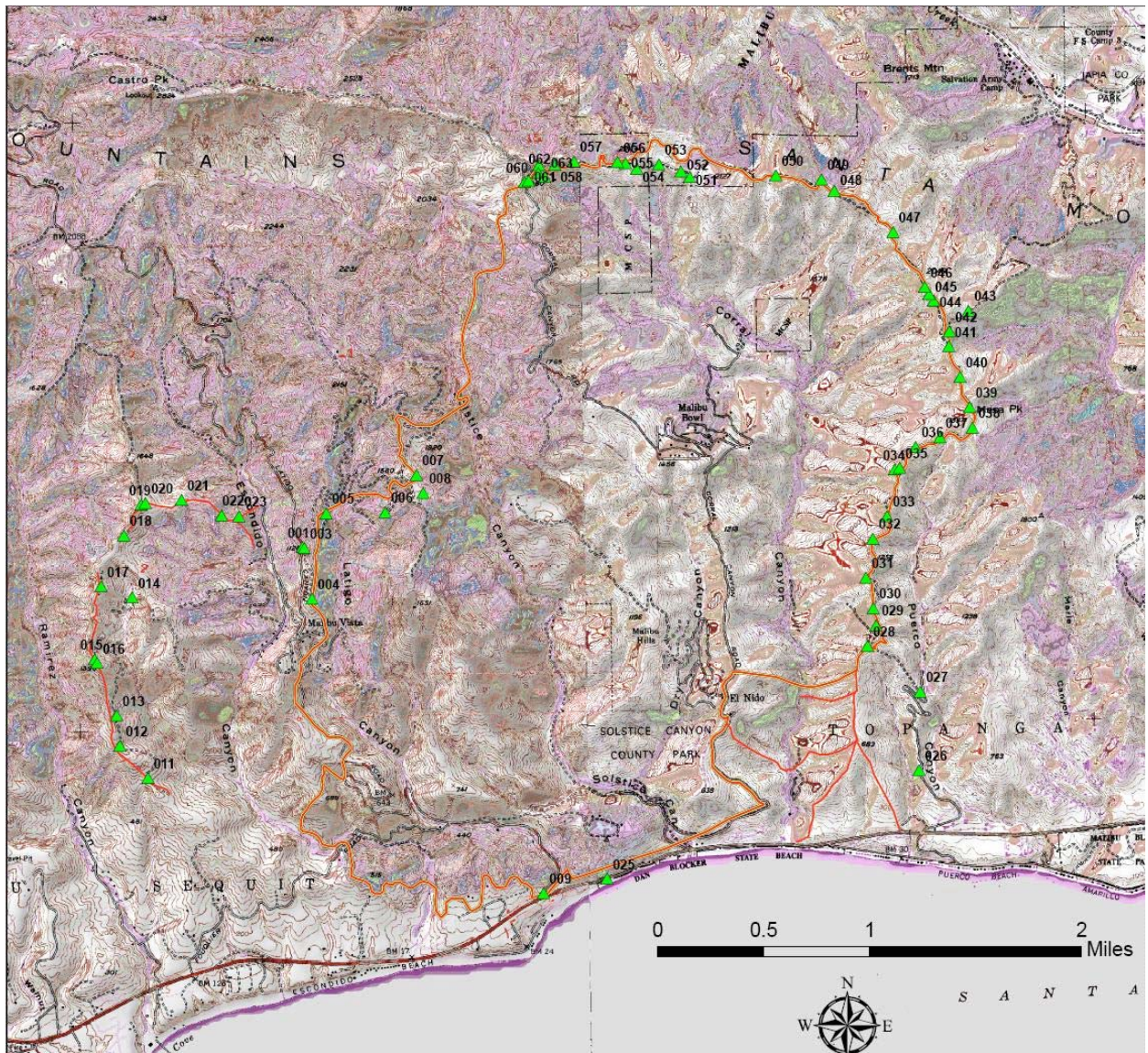


Botanical Appendix C

Weeds with the Corral Fire perimeter



Botanical Appendix D



Survey Route

**TECHNICAL SPECIALIST'S REPORT
Burned Area Emergency Report**

Resource: Cultural Resources (Archaeology/History)

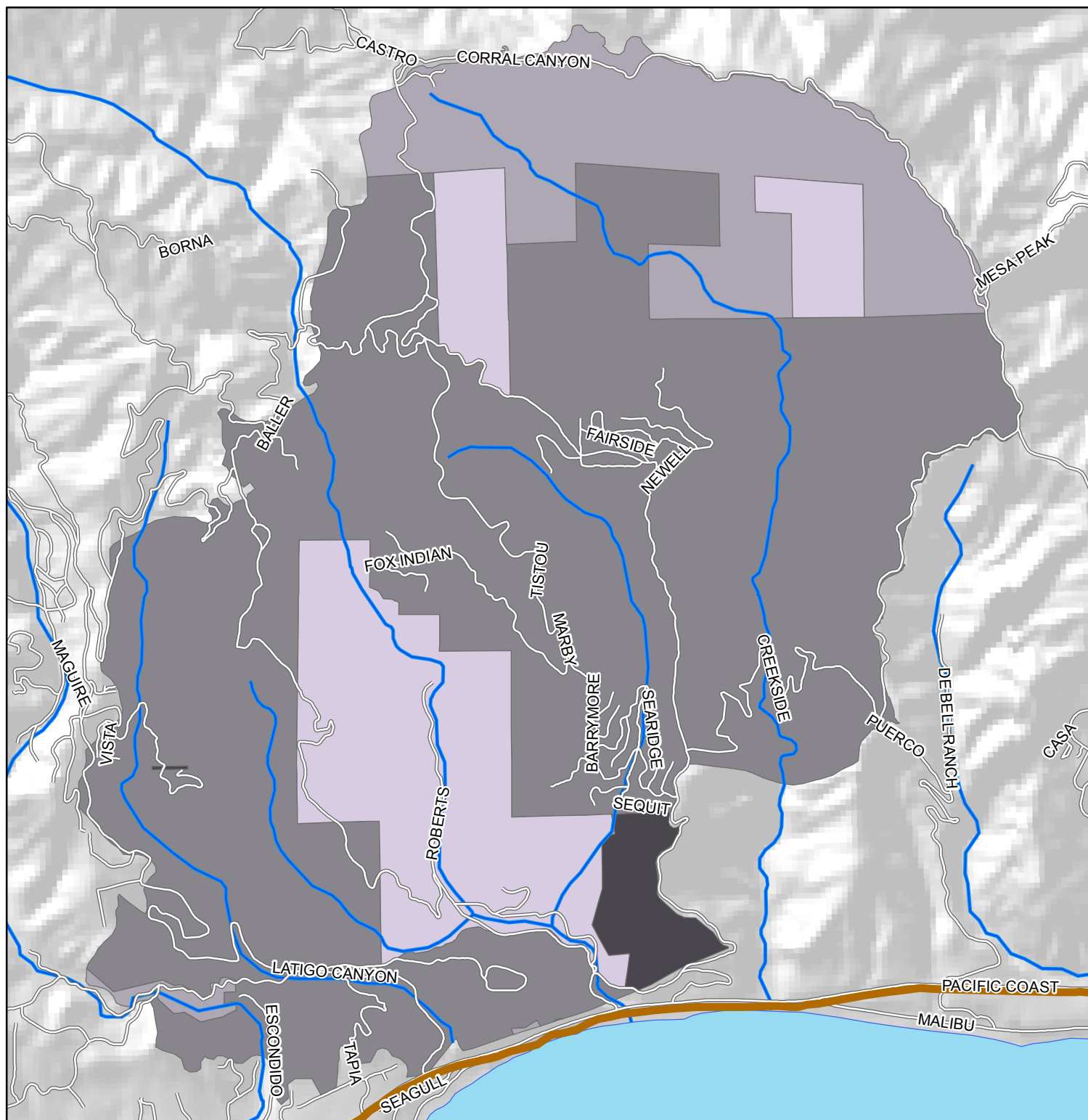
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Month/Year: December, 2007

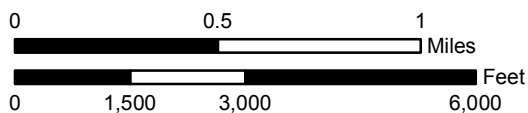
Author Name: Barbara S. Tejada

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CA Department of Parks and Recreation
Angeles District
1925 Las Virgenes Road
Calabasas, CA 91302
(818) 880-0350 x114 Cell: (310) 699-0139
(btejada@parks.ca.gov)

Note This technical study contains confidential information regarding archeological site locations, so it has been removed from public copies of this report in accordance with the policy of the Office of Historic Preservation as adopted by the State Historical Resources Commission under the authority of Public Resources Code 5020.4. The original copy of this material is maintained in a confidential file by the author at California Department of Parks and Recreation's Angeles District Office, 1925 Las Virgenes Road, Calabasas CA 91302.



BAER Team 13
S.Kennedy, GISS(T), VCFPD
Perimeters - LACO FireDept



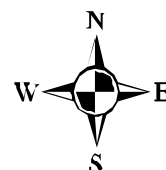
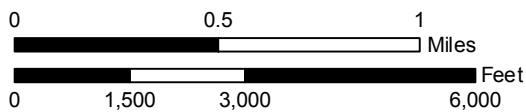
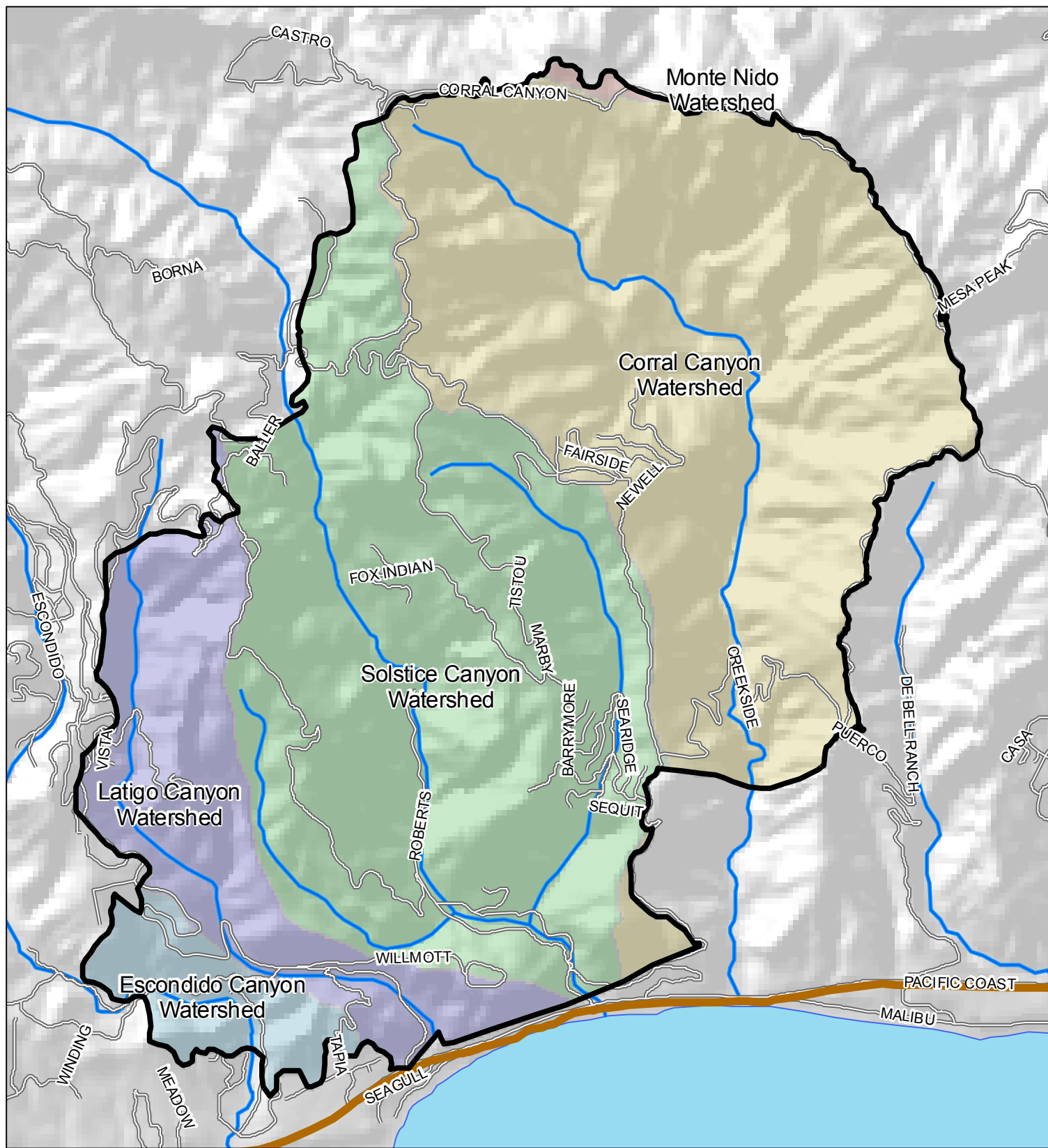
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Final Fire Perimeter, 11/27/2007

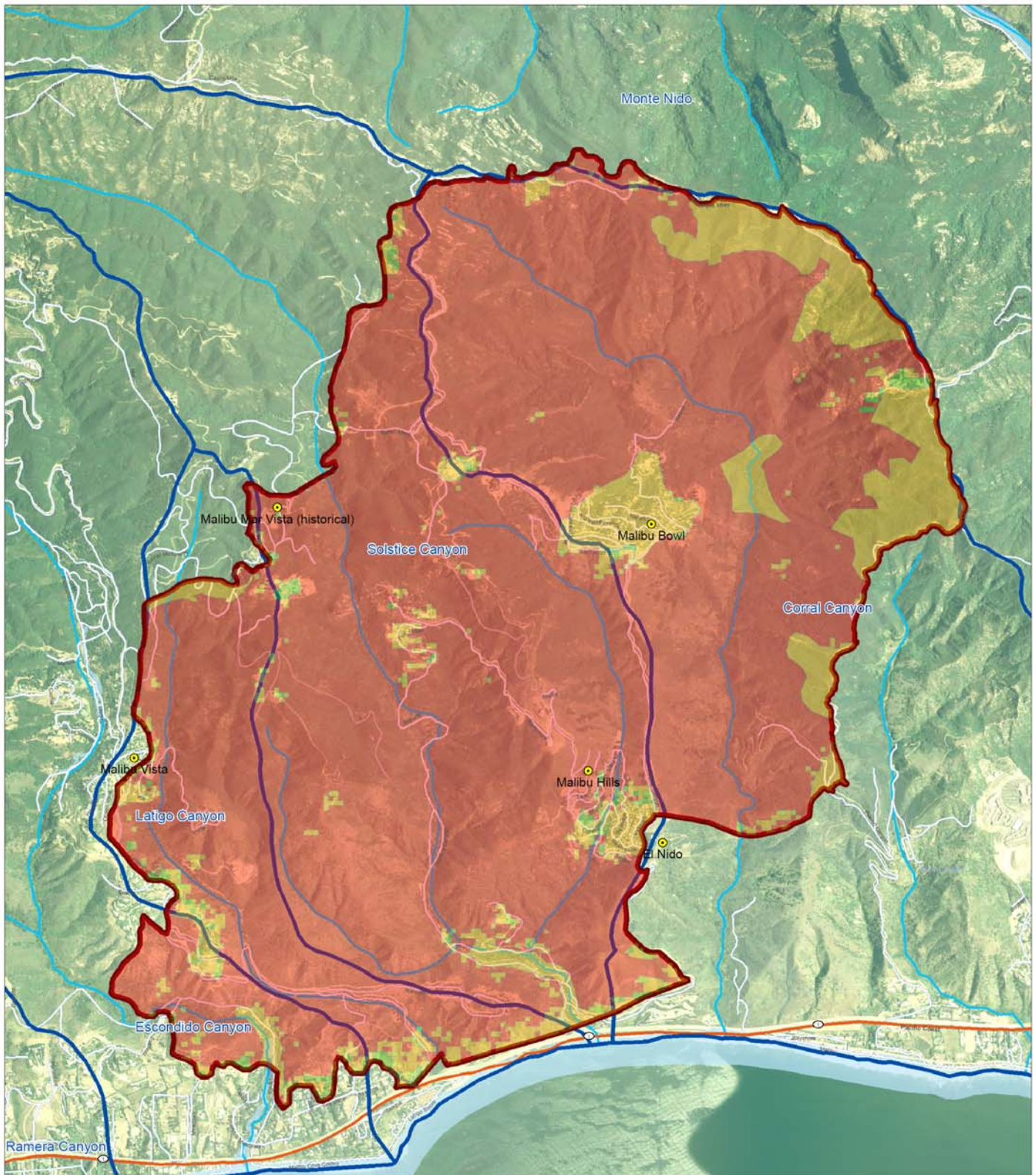
Burn Area Property Ownership

	Private Land	3200.9 (acres)
	National Park Service	744.8
	Other Public Land	668.7
	State Park Land	92.3

Watersheds and Streams

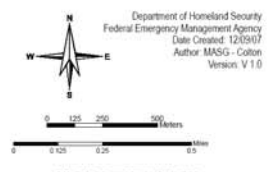


Corral Burn Severity Map

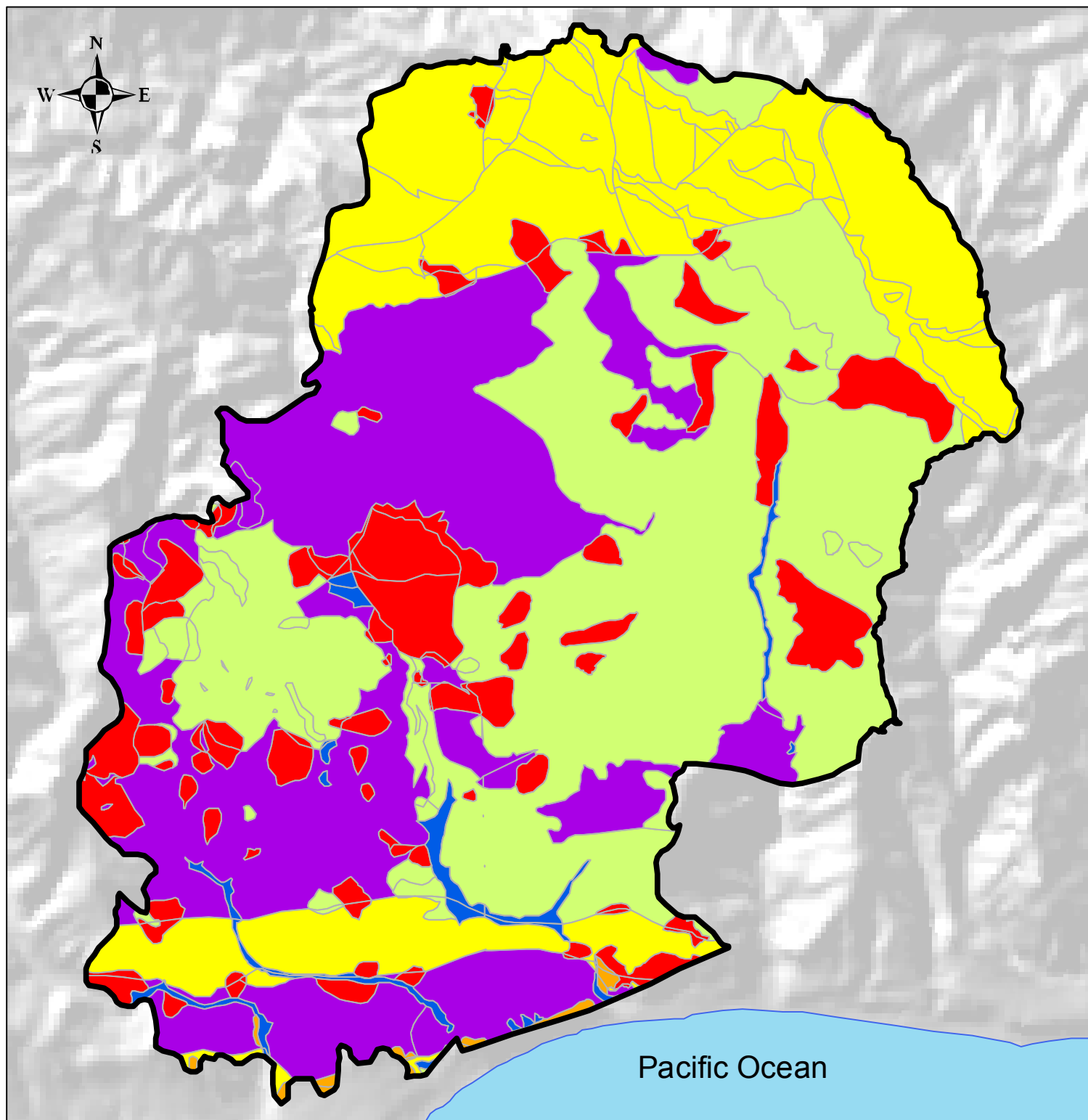









MAP DISCLAIMER
This map was prepared for informational purposes only. It is not intended to be used for insurance rating purposes. For insurance rating purposes, please refer to the Flood Insurance Rate Map currently in effect.

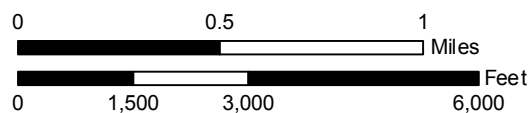
LEGEND		
● Populated Places		
— Streams		
— Highway		
— Major Road		
— Local Road		
— Fire Perimeters		
— Flood Hazard Areas		
— Watershed Delineations		
Burn Severity	Acres	
High	4008.5	
Moderate	636.7	
Low	26.1	
Unburned	37.4	
Total Area	4708.7	



Geologic Map



-  Unstable and/or easily eroded sedimentary, igneous, and volcanic rock
-  Unconsolidated stream, some debris flows -- most not hazardous
-  Landslide material -- can be considered unstable in most cases
-  Sedimentary rock that is mostly stable
-  Volcanic and igneous rock
-  Uncategorized
-  Corral Fire Perimeter, 11/27/2007



BAER Team 13
Created by S.Kennedy, GISS(T), VCFPD
Fire Perimeter - LACO FireDept
Geology Base Data - USGS